California Fish and Game.
v. 13 1927
Bound volume

c.1

DATE DUE

JUN
7-3

California Fish and Game.
v. 13 1927
Bound volume

c.1

DATE	ISSUED TO
JUN 1 '98	J. DeWald DFG R3
NOV 2 '98	R. Hinton DFG R3
7-31-98	[illegible]

California Resources Agency Library
1416 9th Street, Room 117
Sacramento, California 95814

p. 3-4, 5-6 torn out

CALIFORNIA RESOURCES AGENCY LIBRARY
Resources Building, Room 117
1416 9th Street
Sacramento, California
95814

3733

CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

Volume 13 SACRAMENTO, JANUARY, 1927 Number 1

CONTENTS.

Page

AN HISTORICAL REVIEW OF THE LEGAL ASPECTS OF THE USE OF FOOD FISH FOR REDUCTION PURPOSES---*B. D. Marx Greene* 1

EFFECT OF THE RECENT LAW PROHIBITING THE TAKING OF BARRACUDA IN CALIFORNIA WATERS WITH PURSE SEINE OR ROUND HAUL NETS---*J. A. Craig* 18

STRIPED BASS AS I KNOW THEM---*C. E. Hubback* 25

BELIEFE IT OR NOT---*August Bade* 27

INTERESTING BOOKS ON FISH, FISHERIES AND RELATED SUBJECTS---*Ruth Miller Thompson* 29

EDUCATIONAL FILMS AND LANTERN SLIDES OF THE CALIFORNIA FISH AND GAME COMMISSION--- 36

EDITORIALS --- 41

FACTS OF CURRENT INTEREST--- 58

COMMISSION ACTIVITIES --- 59

LIFE HISTORY NOTES--- 66

CONSERVATION IN OTHER STATES--- 68

REPORTS—

FINANCIAL REPORT--- 71

VIOLATIONS OF FISH AND GAME LAWS--- 72

FISHERY PRODUCTS, JULY TO SEPTEMBER, 1926--- 74

AN HISTORICAL REVIEW OF THE LEGAL ASPECTS OF THE USE OF FOOD FISH FOR REDUCTION PURPOSES.

By B. D. MARX GREENE,

Executive Officer and Attorney California Fish and Game Commission.

It seems repugnant to every right-thinking citizen to see fresh food fish used for any purpose other than human consumption. This attitude, accentuated by certain conditions in the wholesale fresh fish market, caused the legislature in 1917 to pass an act giving the state market director power to fix wholesale and retail prices on fish and to

forbid the use of fish by market fishermen for any purpose other than human consumption, except by permission of the director. This statute was tested in court in the case of *Paladini* vs. *Superior Court*, 178 Cal. 369, and its constitutionality was upheld.

This act, however, applied only to market fishermen and did not affect canneries. The abuse by certain canneries becoming acute, the legislature finally took cognizance of this situation and adopted an act in 1919 to control the use of food fish by other than market fishermen in the manufacture of fertilizer and fish oil. This act provided, in brief, that no cannery should use any fish for reduction purposes without first having written permission of the Fish and Game Commission, and no reduction plant should receive any fish for such purposes from any person who did not have such written permission. A further clause in the statute prohibited any cannery from handling or receiving more fish than such concern could actually use without preventable deterioration, waste, or spoilage.

This act as originally passed did not work out very well because it was too difficult for the Commission to determine what was unavoidable waste. Too much discretion had to be vested in the local branch offices of the Commercial Fisheries Department at Monterey, San Pedro and San Diego. Therefore, at the legislative session of 1921 an amendment (Stats. 1921, p. 459) was made to the act, which provided that the Commission could not allow any canner to use for reduction purposes more than 25 per cent of the amount which any such canner could can or pack or preserve for human food during a calendar month. A meeting must be held by the Commission prior to granting such permission and a showing be made by the canner that there was no market for such surplus of fish, and that the taking of such fish and the use of same in the reduction plant would not tend to impair or deplete the species.

The first litigation arising under the amended act was in the nature of an action brought in the superior court of Los Angeles County by the people of the State of California at the request of the Fish and Game Commission against the Stafford Packing Company of San Pedro. The complaint alleged that the defendant, upon its application and after a hearing, was granted a permit to use sardines for the manufacture of fish oil, fish meal, and fertilizer during the time that it was packing sardines for human food purposes only, provided that the amount so used was not to exceed 25 per cent of the total amount of sardines received at the packing plant of the defendant during a calendar month. It alleged that during the month of January, 1923, the defendant used fresh sardines for food canning purposes at its reduction plant in excess of the amount allowed under its permit and in violation of the provisions of law. It further alleged that the defendant threatened to continue such unlawful use "thereby causing great and irreparable loss and damage to the people of the State of California." Affidavits were filed showing that during the month of January the defendant had converted 88.06 per cent of all sardines received by it into fish meal and fish oil.

In the superior court judgment was rendered for the plaintiff. This was reversed by the District Court of Appeal, Second District, Division Two (42 Cal. App. Dec. 726). A hearing was granted by the Supreme

to the amount of twenty-five per cent of the monthly capacity of the packing plant; such capacity shall be determined by the fish and game commission after a hearing is held as in this act provided. In determining such capacity, the fish and game commission must take into consideration and base its findings upon the following facts, namely:

The number of can-closing machines for one pound oval cans of sardines actually installed in said plant and ready for and intended to be used therein during the season immediately following the making of the application hereinafter mentioned; *provided*, that the other equipment of said plant necessary for canning to the capacity of said closing machines is likewise installed for operation. For each closing machine so installed the fish and game commission shall make a monthly allowance of sardines to be used in the reduction plant of 150 tons for each calendar month.

Prior to each seasonal run of sardines, packers shall make written applications to the fish and game commission to hold a hearing and determine such capacity."

The act of which these sections is amendatory provided that the Fish and Game Commission should annually make a determination as to the amount of sardines necessary to be used by each canning plant in excess of its actual canning requirements and that thereupon the Commission should fix such necessary overage, which should not, in any event, exceed 25 per cent of the amount which the canning company could can or pack. This law, as it then existed, was construed by the Supreme Court of this state in the case of the *People* vs. *Monterey Fish Products Co.*, which is reported in volume 69 Cal. Dec., at page 261.

The defendant in that action urged that the act was unconstitutional for the reason that it excluded everyone except those who were engaged in packing fish for human consumption from the privilege of using any such fish in a reduction plant, and at the same time it expressly provided for the granting of such privileges to these favored classes. The Supreme Court, however, declared the act constitutional and the main basis upon which it overcame the presumption that the law was class legislation was that it was necessary for packing plants to be operated efficiently and economically and at the constant rate of output matching maximum capacity; that, in order to insure so far as practical that the catch for the day should approximate the capacity of the packing plant, packers should be permitted to take an amount of fish which at times might result in an excess quantity being brought in, which could only be used for reduction purposes. The Supreme Court said, "The purpose of this is to allow the packer a certain leeway or margin of safety to enable him, so far as practicable, to operate his packing plant regularly and at capacity. There is no reason for allowing to the operator of a reduction plant who is not packing fish for human consumption any margin or leeway whatsoever because he is forbidden to take any fish fit for human consumption for use in his reduction plant."

It is apparent, therefore, that there must be reason and logic to justify the use by a packer of fish in a reduction plant as against such use of fish by a straight-out reduction plant. In the former act it was left to the Fish and Game Commission, after a hearing, to determine the amount of overage necessary for a packer to operate his plant efficiently and economically, and there had to be a finding by the Commission that the taking of such overage by the packer would not tend to deplete the species of fish and also that there was no other market for such fish. Neither of these provisions are contained in the present act. The present act leaves no discretion to the Fish and Game Commission as to the amount of overage to be allowed, nor must there be a finding by the Commission that the taking of such overage will not deplete the supply of sardines. The amount is arbitrarily fixed for the packer at 150 tons per line per month, which in the act is specified to be 25 per cent of the canning capacity of the packer. If, therefore, 150 tons per month is 25 per cent of the canning capacity of the packer, it follows that the capacity of a line for canning purposes is 600 tons per month.

Any interpretation which we may make of the present law as amended must necessarily follow the dictates and be guided by the recent Supreme Court decision. In the light of that decision, where the constitutionality of the former act was attacked, it would be absurd for us to ignore the language

of the court where it says that the overage is allowed by law for a certain definite purpose, namely, in order that the plant of the packer may be efficiently and economically operated. Economical and efficient operation of a plant certainly does not mean that a packer with a given number of machines may allow them to stand idle during the month for canning purposes, and nevertheless take into a reduction plant whole fish to the amount of 150 tons per line. This does not aid him in the operation of his canning plant and he does not need that fish for the operation of his canning plant any more than an independent reduction plant would need such fish for use direct in a plant which has no canning capacity.

Furthermore, there is a provision in the law in the second paragraph of section 5 above quoted that only a packer *actually engaged in packing sardines* may use 25 per cent of his monthly capacity in a packing plant for reduction purposes. Some intent and meaning must be given to the above italicized portion of the act. If we were to give it the meaning that a packer need only run during a portion of the month and thus earn his full 150 tons per line per month for reduction purposes, the clause in question might just as well not be written in the act. To my way of thinking, the only interpretation which can be given to this clause is that a packer, in order to earn the 150 tons per month per machine for reduction purposes, must operate that machine for canning purposes to its full theoretical capacity of 600 tons per month. If he operates it to less than this capacity of 600 tons per month, his overage for reduction purposes must be decreased accordingly.

Unless this interpretation is accepted it is clear to my mind that the second and third paragraphs of section 5 of the act are unconstitutional, owing to discrimination against independent reduction plants, for the packers to all intents and purposes would be running reduction plants without reference to canning requirements. In such event, the act will still stand with these two unconstitutional paragraphs deleted. However, under the first paragraph of section 5, it is provided that "No person shall use any fish except fish offal in a reduction plant." This, then, in final analysis, would mean that no packer could take any overage whatsoever.

My interpretation of this question of constitutionality is borne out by the case of *People* vs. *Monterey Fish Products Co.*, where almost the same identical point was raised, and the court there said, "The general rule is that when a proviso in the nature of an exception to a general statute is invalid the general provisions of the statute are not invalidated thereby unless it clearly appears that the provisions of the exception are so intimately and inherently related to and connected with the general provisions to which it relates that the legislature would not have enacted the latter without the former."

In my opinion, the act is constitutional and not discriminatory if we interpret it to mean that the packer must operate a line to a theoretical capacity of 600 tons per month in order to obtain an overage of 150 tons per month. In other words, the packer can use for reduction purposes 20 per cent of the fish which he takes into the plant. If the line is not run to this theoretical capacity, the amount allowed for reduction is decreased accordingly, using at all times the ratio of 80 per cent of the fish for canning and 20 per cent for reduction. This amount for reduction purposes could well be deemed necessary in order to insure a good pack and effect economical and efficient management.

Under section 3 of the act, the Commission is vested with power to make and enforce regulations. Our orders which will be issued would only determine the theoretical canning capacity of the plant and allow an overage of 150 tons per line based upon that theoretical capacity. For practical purposes it will be necessary for the Commission to establish some standard by which to determine whether or not a packer is keeping within the allowance permitted by statute. To do this, it will be necessary to estimate the usual number of cases of canned goods manufactured out of a ton of sardines. A rule should be adopted by the Commission establishing such a ratio, so that the packers may use it as a practical guide in determining whether they are keeping within the amount allowed by law.

The Commission, after accepting this opinion, adopted General Order No. 1, which reads as follows:

> Pursuant to the provisions of section 3 of chapter 340, Statutes 1925, the following regulations are hereby made to govern packers of sardines:
>
> *Regulation No. I.*
>
> In order to determine whether a packer is actually engaged in packing sardines, this Commission will require that for each ton of sardines received by a packer during a calendar month he shall produce fifteen (15) cases of one pound ovals (48 cans to the case) or the equivalent if other size cans are used.
>
> *Regulation No. II.*
>
> Each packer must keep a daily record of the number of cans of sardines actually packed.
>
> *Regulation No. III.*
>
> Each packer shall make a monthly report to the Fish and Game Commission showing the total amount of sardines, in pounds, received by him during the preceding month, the total number of cases canned during said month, and the total amount of fish meal, fish oil, fertilizer or other by-products manufactured during said month. Blanks for this report will be furnished by the Commission and such report must be received by the Commission not later than the fifth day of the month following. The report shall be verified by an affidavit of the packer, or an officer if the packer is a corporation, to the effect that the report is a true and correct record of the matters therein alleged.
>
> The foregoing order is hereby approved and ordered filed as "General Order No. 1 of the Fish and Game Commission of the State of California."

The theory upon which General Order No. 1 was based was the generally accepted understanding that if a packer used for canning purposes all the fish received, he could pack 20 cases of 1-lb. oval cans of sardines. Therefore, if only required to pack 15 cases for each ton he was receiving an overage allowance of at least 25 per cent. Furthermore, the Commission can then check on the packer, for the receipts of fish are known and the pack can be ascertained. Otherwise a check is difficult for it is almost impossible to ascertain the exact quantity of bulk fish actually diverted to the reduction plant.

Certain of the packers immediately prepared to contest this General Order upon the theory that the Commission must make a general determination of the capacity of each packing plant, and give a full allowance of 150 tons per line per month, irrespective of the actual amount of fish canned. The Commission, however, proceeded to enforce the provisions of the General Order.

The first court proceeding arising thereafter was another case brought in the name of the people of the state against the Monterey Fish Products Company, which again attempted to use fresh sardines for fertilizer purposes only. The action came on for hearing in the Monterey superior court, after a temporary restraining order had been granted, and upon the trial on the merits the superior court gave its judgment, making the injunction permanent and ordering that the premises be abated and closed for a period of three months. This was the test of the new teeth in the law.

The next court action involved the violation by a packer at Monterey of General Order No. 1, in that the packer had taken and used for reduction in one calendar month more than the amount of fish allowed by the order. The testimony showed that this packer had only packed 14 cases of sardines out of each ton of fish received. The matter went to trial, and before judgment was rendered by the court a stipulation was entered into by the parties that until the final decision in certain cases then about to be commenced in the District Court of Appeal at Los Angeles, the court should make its order modifying the temporary restraining order originally entered so that during the further pendency of the case the defendant should obey General Order No. 1 of the Commission. The defendant in the meanwhile had been enjoined from using any fish at all for reduction purposes.

Certain of the packers banded together in Los Angeles County and commenced proceedings against the Fish and Game Commission in the District Court of Appeal, Second Appellate District, Division 1. Two separate series of proceedings were instituted. One set of actions involved an application for a writ of certiorari to review the order of the Commission fixing the capacity of the canning plants, and was particularly directed to General Order No. 1, which was made a part of the Commission's order determining capacity. The petitioners sought to have the order of the Commission reviewed upon the ground that the Commission acted beyond its authority in making this General Order No. 1 a proviso of the permit.

The second set of actions, started contemporaneously, were in the nature of a petition for a writ of mandamus to compel the Commission to make orders determining capacities of plants entirely upon the basis of the number of 1-lb. oval can-closing machines installed, and omitting entirely any reference to General Order No. 1 regulating the amount of fish that must be canned in order to obtain an overage.

To the petition for the writ of certiorari the Commission filed its general demurrer, and upon the argument claimed that the act of the Commission in determining the capacity of the canning plants was not judicial in its nature and therefore the writ of certiorari would not lie. The District Court of Appeal sustained this contention of the Commission and discharged the writ. (*Van Camp Sea Food Co., Inc.*, vs. *Fish and Game Commission*, 49 Cal. App. Dec. 38, decided Dec. 23, 1925.)

In the decision, however, the court lays down very fundamental rules as to the powers of the Fish and Game Commission, and expressly holds that a commission such as the Fish and Game Commission, which is one having a state-wide jurisdiction, can not be invested with judicial functions for the reason that "except for local purposes" section 1 of article VI of the constitution confines all judicial powers to certain specified courts.

The other five applications for writ of certiorari were likewise dismissed by the appellate court for the same reason.

In the cases for a writ of mandamus the Commission based its defense upon the fact that portions of the act of 1925 were unconstitutional in that the act contained no provision giving to packers of sardines other than those packing their product in 1-lb. oval cans the right to have the packing capacity of the plant determined by the Commission, to the

end that a monthly allowance of sardines should be made to be used in a reduction plant for fertilizer or other purposes. The appellate court sustained this contention of the Commission and also dismissed this petition. Unfortunately, the appellate court in its decision did not explain exactly how much of the act in question was unconstitutional and for this reason further litigation has ensued between the packers and the Commission.

Certain packers took the view that although the special method of determining the amount of reduction allowance had been declared unconstitutional by the court, this only meant that there would no longer be an arbitrary allowance of 150 tons for each line of 1-lb. oval can-closing machinery installed, but that any packer, irrespective of the kind or size of pack, was still permitted monthly to use 25 per cent of his canning capacity for that purpose. They further claimed that the Commission no longer having judicial functions there could not be hearings by the Commission to determine the capacity of the packing plants, and that therefore the packing capacity was a fact to be determined in each instance by the court in the event that the Commission felt that the packer had used in any calendar month more than 25 per cent of capacity for reduction purposes.

Five proceedings for injunction were commenced by the Commission in the Los Angeles superior court upon the theory of the Commission that since the appellate court's decision in the Van Camp Sea Food case on the writ of mandate, no packers were thenceforth entitled to any allowance for reduction whatsoever. That if the method of determining the capacity of a plant had been declared unconstitutional there could be no reduction allowance.

The cases came on for hearing, and in a ruling upon a demurrer filed by the defendants, the court held that the decision of the appellate court could not be construed to mean that the packers were entitled to no reduction allowance. The court held that any packer was still entitled to an allowance for reduction purposes of 25 per cent of the capacity of the plant but that the Commission was without judicial power to determine such capacity.

The following written memorandum opinion was rendered by Judge Albert Lee Stephens:

> The Fish and Game act was enacted primarily to conserve the wild game and fish of the state and the portion of this act to be herein considered is as follows:
>
> "Section 5. No person, firm or corporation shall suffer or cause any preventable deterioration or waste of any fish caught or taken in the waters of this state, or brought into this state, and no person shall use any fish except fish offal in a reduction plant, except of the species, in the manner and to the amount allowed by the provisions of this act.
>
> (a) It shall be lawful for a packer of sardines, actually engaged in packing sardines, to take and use in a reduction plant in each calendar month, sardines to the amount of 25 per cent of the monthly capacity of the packing plant; such capacity shall be determined by the Fish and Game Commission after a hearing is held, as in this act provided. In determining such capacity the Fish and Game Commission must take into consideration and base its findings upon the following facts, namely:
>
> The number of can closing machines for one-pound oval cans of sardines actually installed in said plant and ready for and intended to be used therein during the season immediately following the making of the application hereinafter mentioned; *provided*, that the other equipment of said plant necessary

for canning to the capacity of said closing machine is likewise installed and ready for operation. For each closing machine so installed the Fish and Game Commission shall make a monthly allowance of sardines to be used in the reduction plant of one hundred and fifty tons for each calendar month."

This provision makes it unlawful to use any fish in a reduction plant and then states the exception. The exception is that sardines to the "amount of 25 per cent of the monthly capacity of the packing plant" may be used in a reduction plant. The problem for solution is, just what does this last quoted phrase mean. The state contends that it means 25 per cent of the amount of sardines it actually takes in, this per cent to be figured over the calendar months. The defendant contends that it means 25 per cent of the possible turnout of the plant without regard to the amount taken in, in each calendar month.

The phrase standing alone could mean nothing but what defendant claims it means.

The phrase considered in the light of its use in the quoted part of the statute may well mean what the state claims it means and after careful consideration I would so find. Section 5 sub (a), however, as enacted by the legislature defined the method of determining "capacity" and this method is wholly consistent with defendant's contention and wholly inconsistent with the state's contention as to the true meaning of this phrase.

It is true this portion of the statute has been determined to be unconstitutional and inoperative but it still stands as an expression of the legislature made at the very time and intended to be an effective part of the statute and is so clear that I am compelled to regard it as an unequivocal expression of the legislative intent in the use of this phrase. I, therefore, adopt the defendant's contention.

The very purpose of the law, however, impels certain qualifications of the meaning of "monthly capacity of the packing plant" in order that it shall be consistent at all with the law and its purpose. Among such qualifications must be:

If any part of the plant is not in good faith held in readiness the "capacity" is reduced proportionately.

No packer can maintain a plant larger than he in good faith intends to operate under all reasonable conditions and gauge his reduction allowances upon the full capacity of his plant. The "capacity" is reduced proportionately.

No packer can make inadequate arrangements for the production of fish to the amount of his plant's operation capacity and yet base his reduction allowance upon his plant's operating capacity. The "capacity" is reduced proportionately.

The point to be decided here is raised by an objection to the following question: "Now, during the month of January, 1926, are you familiar with the equipment and machinery and appliances in the plant of the Italian Food Products Company that were used and usable for the purpose of canning sardines?"

Defendant offered to proceed and prove the full capacity of the plant.

The objection will stand overruled and if the cause continues the proffered proof will be received.

The ultimate question as to whether or not defendant has violated the act will in addition to the proffered proof depend upon the proof (the burden of producing such proof is not here considered) of the "qualifications" to the meaning of plant capacity as herein referred to.

This still left the law in a most unsatisfactory condition and the cases are still pending.

In the meanwhile a question arose as to the right of reduction plants to take and use sardines for the purpose of making edible oil products. In the 1925 amendments to the act, special provisions were inserted to allow the use by a reduction or extraction process of sardines for the purpose of manufacturing edible products. Hearings were to be held by the Commission, and if it were established to the satisfaction of the Commission that the product proposed to be manufactured was in fact

edible, was intended to be used for human consumption and would in fact be used for human consumption, and if 50 per cent of the wet weight of the fish, or all of the oil extracted, were used in such process then the Commission could give a permit for the use of sardines for such purposes. During the year 1925 several such permits were issued by the Commission after proper hearings held thereon.

When the appellate court held that the Commission no longer had judicial power, an opinion was given to the Commission by its attorney to the effect that the Commission no longer had the right to hold hearings to determine the facts necessary on which to base a permit for the use of fish by a reduction or extraction process for the purpose of making edible products. Testimony would have to be taken at such hearings and the Commission would have to render a judicial opinion.

In September, 1926, the Bayside Fish Flour Company, in Monterey, proceeded to test out this ruling by the Commission and took fish into its plant to manufacture into an edible product. The Commission immediately commenced injunction proceedings in the superior court of Monterey County and raised the point that the granting of such a permit would be a judicial act by the Commission, and that therefore the permit heretofore granted to this defendant during the previous year and under which it was still acting was null and beyond the jurisdiction of the Commission and that therefore the defendant had no right to operate during the current year.

All technicalities were waived in the proceedings and it came on for a speedy trial before Judge Treat at Salinas. Judge Treat rendered his decision in favor of the defendant ruling, in effect, that the Commission still had judicial functions.

We thus see that we have two conflicting decisions in the superior court on this very same question. In the Los Angeles court it has been held that the Commission has no judicial functions; in the Monterey court it is held that the Commission has judicial functions.

This question is now about to be decided finally by the Supreme Court. The Globe Cotton Oil Mills of Los Angeles are seeking by a writ of mandate in the Supreme Court to compel the Commission to hold a hearing upon its application for a permit to use sardines by a reduction process for the manufacture of an edible fish oil.

The law was still due for a severe test. It having been absolutely decided that no reduction plant can any longer take fish direct from the sea and manufacture an inedible product, such as fish meal or fertilizer, a very lucrative business had been cut off. In October of this year a new method of evading the law was attempted. An old concrete vessel *Peralta*, built during war times but now without motive power, was equipped with reduction apparatus and towed to a location in Monterey Bay, slightly more than three miles from shore but inside the headlands. The claim was made that this vessel was not subject to the jurisdiction of the state because it was upon the high seas and beyond the three-mile limit. Two purse seine boats from Los Angeles were engaged to fish for the barge and operations commenced. The Fish and Game Commission immediately arrested the captains of the purse seiners and charged them with violating the provisions of the Fish Exchange Act which forbids the diversion of food fish to purposes other than human consumption without the written consent of the

state market director. The purse seines of both fishing boats were seized and injunction proceedings commenced against the Ocean Industries, Inc., the owner of the *Peralta*. A temporary restraining order was granted by the superior court of Santa Cruz County.

The defendant immediately filed a petition for an injunction in the Southern Division of the United States District Court, Northern District of California, Third Division, at San Francisco, claiming that it was a foreign corporation and that the Commission and its officers were acting beyond their authority, in that the vessel *Peralta* was located upon the high seas and beyond the jurisdiction of the state. They claimed $9,000 damages accrued by virtue of the seizure of the nets and other actions of the Commission, and for further damages of $1,000 per day. The matter came on almost immediately for hearing upon the application for temporary injunction, and this was denied by

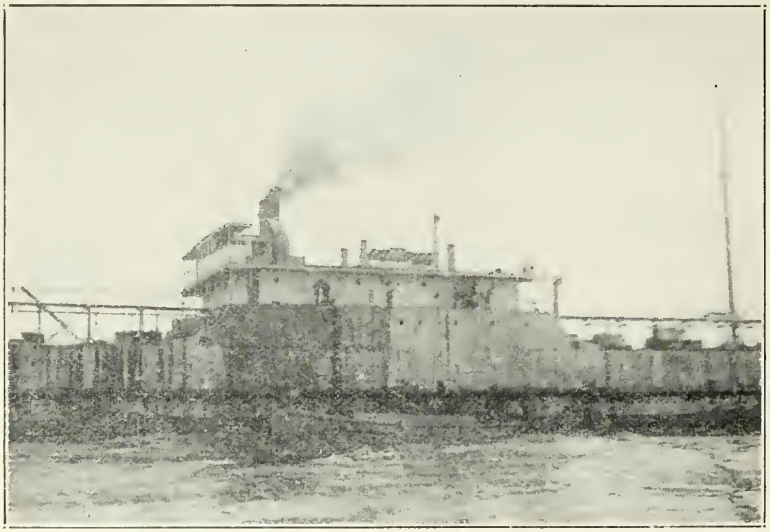


FIG. 1. The steamer *Peralta*, a floating reduction plant anchored in Monterey Bay. Two purse seine boats furnished large quantities of food fish to this plant until a restraining order, granted by the superior court, put a stop to operations. Photograph by B. D. M. Greene.

Federal Judge A. F. St. Sure, who handed down from the bench his oral opinion that all of Monterey Bay was within the state of California. The Fish and Game Commission presented a motion to dismiss the bill of complaint and this was granted on November 13, 1926, and an exhaustive written opinion rendered by the court as to the legal status of Monterey Bay. This is practically the first time in the United States, or in any other jurisdiction, where any court of competent jurisdiction has come out flat-footed upon the question of territorial jurisdiction over a bay the distance between headlands of which exceeds six miles. Monterey Bay is 21 miles between promontories. Judge St. Sure's decision follows:

> Plaintiff, a corporation organized and existing under the laws of the State of Nevada, files a bill in equity seeking an injunction and damages against

certain members and officers of the Board of Fish and Game Commissioners of the State of California.

Plaintiff is the owner of the *Peralta*, a vessel of more than 6000 tons burden, equipped with machinery and operated as a reduction plant in Monterey Bay, California. Plaintiff chartered two fishing boats, employed fishermen to catch fish and deliver them to the *Peralta*, where they were made into fish oil and fish meal. No sooner had the reduction plant commenced operating than the Fish and Game Commission of the State of California took action to stop what it contends is an unlawful destruction and diversion of food fish. Arrests of fishermen were made for violation of state fish and game laws, and an injunction was sought and obtained in a state court against plaintiff herein restraining it from operating its reduction plant in the waters of Monterey Bay.

The question presented to this court for decision, upon motion to dismiss, is whether or not plaintiff is operating its reduction plant within the jurisdiction of the State of California. The bill alleges that the exact position of the *Peralta* is latitude 36 degrees 53 minutes north, longitude 121 degrees 56 minutes west, which, it is admitted, is well within the indentation of the bay and the waters bounded by the shoreline of Monterey Bay and a straight line drawn between headlands Pt. Pinos and Pt. Santa Cruz. The fish, it is also admitted, are caught within these waters.

It is conceded that fish in the high seas are the property of whoever first can take them; that the territorial jurisdiction of the State of California extends only three miles into the waters of the Pacific Ocean from low water mark, and that the people of the state have a qualified property right in the fish while in those waters; that beyond the three-mile limit the State of California has no right in or to the fish, nor has it any right to interfere with any fishing operations upon the high seas beyond that line; that the federal government has never assumed to regulate and control the handling of fish for the prevention of waste, nor to regulate or control the use of fish or fishery products for reduction purposes in Monterey Bay, while the State of California, by suitable legislation, has assumed and is asserting such jurisdiction.

Monterey Bay is about 19 miles across headlands, and its indentation is about nine miles. Plaintiff contends that because of the great breadth at the mouth of the bay and its shallowness, it is in fact open sea, and has been designated a bay merely for convenience.

Plaintiff argues that if the bay exceeds six miles in width in a straight line measured from headland to headland, it is not territorial water but open sea. Monterey Bay, as we have seen, is 19 miles across from headland to headland. There is authority supporting the proposition that to constitute a bay under the law there is no limit to distance between headlands fixed at an arbitrary limit of six miles. A statute of Maryland was enacted for the purpose of preventing the destruction of oysters in the waters of that state, and a vessel was seized while dredging for oysters in Chesapeake Bay. The bay is 12 miles across at the ocean. The statute was upheld. (*Smith* vs. *Maryland*, 18 How. 71.) Conception Bay, more than 20 miles wide between promontories, was held to be part of the territory of Newfoundland. (*The Direct U. S. Cable Co.* vs. *Anglo American Tel. Co.*, L. R. 2 App. Cas. 394.) Moray Firth, more than three miles from shore, held British territory. (*Mortensen* vs. *Peters*, 14 S. T. L. 227.) So, too, the United States includes in its territorial waters Chesapeake Bay, the entrance to which is 12 miles from headland to headland; Delaware Bay, which is 18 miles wide; and Cape Cod Bay, which is 32 miles wide; as well as other inlets of a similar kind. (Pitt Corbett "Leading Cases on International Law," 4th ed., p. 145.)

The boundary of the State of California is defined in the constitution of California, section 1 of article XXI, and includes "all the islands, harbors and bays along and adjacent to the coast." The quoted language declares in effect that Monterey Bay is a part of the territory of the state.

In addition to the constitutional definition of the state's boundary as including all bays, there is also section 25½ of article IV of the state constitution, which provides that "the legislature may provide for the division of the state into fish and game districts, and may enact such laws for the protection of fish and game therein as it may deem appropriate to the respective districts."

In accordance with this constitutional authorization the legislature has adopted several comprehensive acts dividing the state into districts and providing for the protection and conservation of fish and game. District number 17, defendants contend, includes all of Monterey Bay, while plaintiff points out that the language designating the boundaries of the district admits of no such generous interpretation. The boundaries of the district, as including all of the bay, may not be clearly described, but under the circumstances I feel constrained to accept the defendants' claim in that regard.

I am therefore of the opinion, based upon the facts of the instant case, it appearing that the state, by its constitution having declared Monterey Bay within its boundary; having by suitable legislative enactments assumed and exercised jurisdiction over the waters and fisheries in controversy there being no affirmative action of Congress taking such control, that this court is without jurisdiction to further proceed in the matter. It follows that the motion to dismiss must be granted and it is so ordered.

In the meantime a hearing was held in the superior court of Santa Cruz County on the order to show cause why the temporary injunction

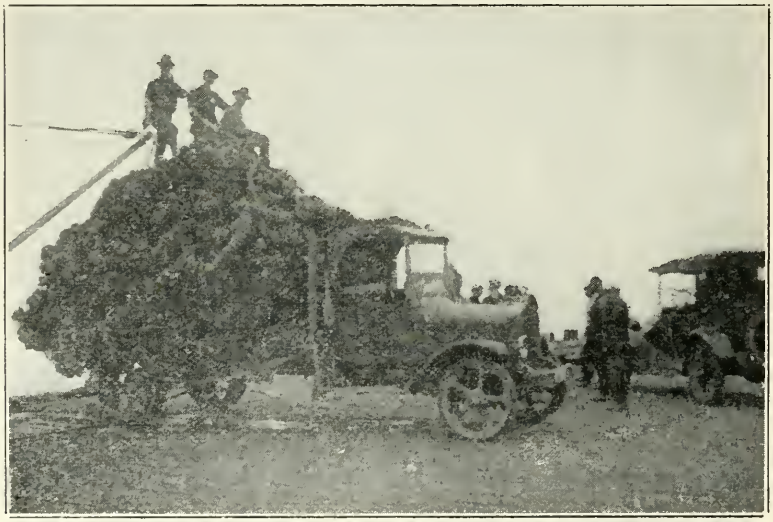


FIG. 2. A number of confiscated nets, valued at $6,000, secured from Steamer *Peralta*, a floating reduction plant. Photograph by B. D. M. Greene.

should not be made permanent during the continuance of the case, and on November 1, 1926, Judge H. C. Lucas of that court granted an order for an injunction *pendente lite*. Thereupon the defendant, Ocean Industries, Inc., applied to the Supreme Court for a writ of prohibition to prevent the superior court from further proceeding with the pending case. This alternative writ of prohibition was issued returnable Tuesday, November 16, 1926, and was then argued before the Supreme Court at Sacramento, sitting *en banc*. On January 11, 1927, the Supreme Court handed down its decision (73 Cal., Dec. 99) denying the writ of prohibition, and sustaining the Fish and Game Commission on every point. Not only did they hold that all of Monterey Bay and for a distance three miles beyond the headlands was within the State of California, but they also held that the barge *Peralta* was actually located within Santa Cruz County.

While this case was pending in the Supreme Court, the Ocean Indus-

tries, Inc., removed the barge *Peralta* from Monterey Bay and anchored it in the Santa Barbara channel, outside of the three mile limit, but it has never used any fish for reduction purposes at that point, owing to its inability to get any fishermen to work for it.

On December 23, 1926, the Ocean Industries, Inc., started a new suit against the Fish and Game Commission, and its employees, in the United States District Court for the Southern Division, asking for an injunction to prevent the Commission from interfering with the operations of the *Peralta* beyond the three mile limit and for damages for alleged acts of the Commission in preventing fishermen from working for it. This matter came on for hearing before the district court on an order to show cause, and the application for a temporary injunction was denied.

On February 1, 1927, the captains of the two purse seine boats, who had been arrested in Monterey Bay for diverting food fish to the *Peralta* without permission from the state market director, came into the justice's court and pleaded guilty and were each fined $100. Immediately thereafter, on February 3d and 4th, two superior court cases came on for trial in the superior courts respectively of Monterey County and Santa Cruz County, which had been instituted by the Fish and Game Commission for the purpose of condemning the two purse seine nets seized from these fishing boats. The captains of the two boats put in an appearance in court and claimed the nets as their property, and alleged that there had been no violation of law in their use. The matter was fully argued in both courts, and at this date of publication the matters still stand undecided as both superior courts have requested briefs upon the subject.

While all this litigation with the owners of the *Peralta* was pending another boat, the *Lake Miraflores*, was commissioned by Stanley Hiller, Inc., to cruise outside the three mile limit and take sardines for reduction purposes. This boat differed from the *Peralta* in that it had motive power on board in addition to reduction apparatus. The owners of the *Lake Miraflores* hearing that the Commission might take steps to interfere with their operations outside the three mile limit, suddenly applied to the superior court of Alameda County for an injunction. The matter was fully argued in the court and submitted to a decision. Prior to the time the court gave its ruling the action was dismissed. Thereafter the *Lake Miraflores* put to sea and attempted to get fishermen to fish for it in Santa Barbara channel. No fishermen, however, seemed to be willing to take a chance and the vessel put back into San Francisco Bay. A conference was then held with the officials of the Commission and the owners of the boat suggested installing a cannery on board so as to comply with the California law. The matter was regarded as settled. However, the *Lake Miraflores* again put to sea without cannery equipment and anchored a short distance below San Pedro, in San Pedro Bay, about four and a half miles from shore, but within the bay as defined in the recent Supreme Court decision in the *Peralta* case. They there took a small amount of fish and manufactured it into fertilizer. The Commission immediately instituted an injunction suit in the superior court in Alameda County, asking for a permanent injunction against the boat and for its abatement for three months as a penalty. This action is still pending and the boat is under temporary restraining order.

EFFECT OF THE RECENT LAW PROHIBITING THE TAKING OF BARRACUDA IN CALIFORNIA WATERS WITH PURSE SEINE OR ROUND HAUL NETS.*

By J. A. Craig.

Since the law prohibiting the taking of barracuda with purse seines or round haul nets went into effect in July, 1925, the burden of supplying the markets with barracuda has fallen very largely upon the gill netters. At the present time approximately 85 per cent of the barracuda brought into Los Angeles County from local waters is taken with gill nets. The small, remaining percentage is chiefly taken by gig boats, with a very few caught by live bait or on set or hand lines. Therefore, any changes in the barracuda fishery, since the enforcement of the anti-

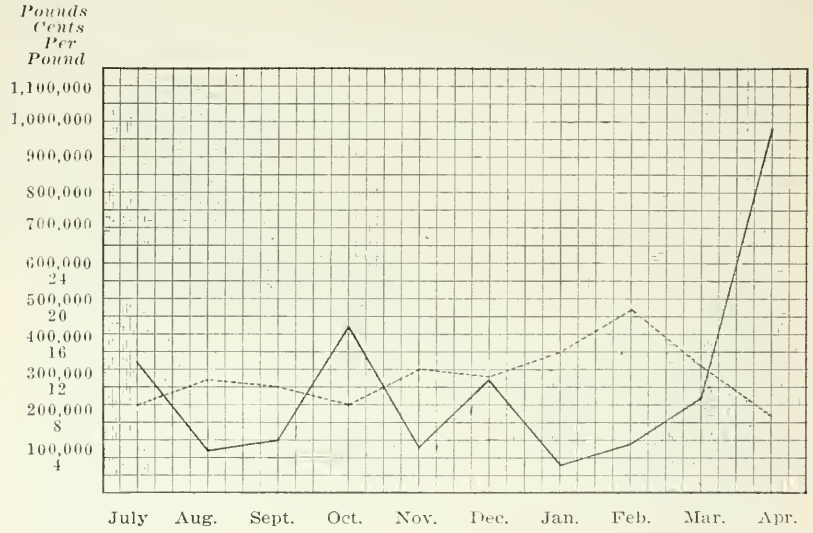


Fig. 3. Relation of catch and price of local and Mexican barracuda in Los Angeles County.

purse seine, round haul net law, can be attributed to the monopolizing of the fishery by the gill net method.

The most notable result of this change in methods is the falling off of the total catch. The catch for the ten-month period, July, 1925, to April, 1926, inclusive, was 1,273,289 pounds; the average catch for the same period in the five preceding years, 1920 to 1924, inclusive, was 1,899,171 pounds. This is a falling off of 33 per cent of the average catch for the periods, July to April during the years 1920 to 1924, inclusive, in the same period of 1925–1926.

As would be expected, this drop in supply brought about a rise in price. So we have an average price for the July to April periods, of the years 1920 to 1924 inclusive, of 9.81 cents per pound, and an

*Contribution No. 65 from the California State Fisheries Laboratory, June, 1926.

average price of 13.16 cents per pound for the period, July, 1925, to April, 1926, inclusive.*

The way in which the price fluctuates with the supply can be seen in figure 3, where average monthly price and monthly catch for the period, July, 1925, to April, 1926, inclusive, are both plotted. It will be noticed that in every case, except one, the price rises where the catch falls and falls where the catch rises. This exception is in the month of February when the supply and price both rose. This might have been caused by a general shortage of fish other than barracuda at that time.

One of the arguments used against the purse seiners was that they kept the market in an unstable condition by bringing in large quantities of barracuda at irregular intervals. So now the question arises, whether the gill netters and gig boats are bringing in a more constant supply of fish, now that they have the field to themselves, than they did when combined with the purse seiners and round haul fishermen.

In figure 4 the monthly catches of barracuda caught in California waters and landed in Los Angeles County for the periods from July, 1925, to April, 1926, inclusive, and monthly averages over the same periods during the years 1920 to 1924, inclusive, are plotted. It can be seen that the catch in July, 1925, was above the average catch for that month in the preceding five years, but dropped very rapidly in August and continued at a low level until April, when it again made an enormous leap to be equal to the average catch.

The average monthly catch of the five-year period, however, has no such abrupt drop in August and keeps a much higher average until January is reached, when it seems there is a shortage of locally caught fish under any conditions. The average catch for February and March is also above the 1926 monthly totals, while the month of April is equally great in both cases.

In figure 5 the average monthly prices, for periods corresponding to the catch figures used in figure 4, are plotted. As would be expected the prices for July, 1925, and April, 1926, are fairly close to the average prices of the same months in the preceding five years, but in the remainder of the 1925–1926 season when the catch dropped far below the average, the price soared above the average price for the same period of the preceding five years.

The catch for one year would be expected to vary more than the average of five years, so in order to get a better comparison of variability, the season of July, 1925, to April, 1926, inclusive, was plotted with like seasons of 1922-1923 and 1924-1925 in figure 7. It is evident from this figure that both of these latter seasons, especially that of 1924-1925, keep up their average from August to March, inclusive, far better than the season of 1925–1926 and have not such a great range of variability.

In figure 6, the average monthly prices for seasons corresponding to the catch figures used in figure 7 were plotted. The prices for the 1925–1926 period are seen to be more variable than those of the other seasons plotted and an inverse condition to the catch exists, with the prices reaching a much higher level from August to March, inclusive, than either the 1922–1923 or the 1924–1925 period.

*Complete tabulations are available from the State Fisheries Laboratory, Terminal, California.

To get a more direct comparison of monthly catch variability of the 1925-1926 period to that of the other two seasons plotted in figure 7, the mean deviation of each of the three periods was determined. This was done by summing up the monthly totals of each of the three periods separately and dividing the sums of each by the number of months, thus securing the arithmetic mean of the monthly catches of each period (season). The difference of each monthly total from the mean of its period was then found and the differences for each month in the same period were summed up. The sums of the deviations in each period were then divided by the number of months in their respective periods, in each case ten, and the mean deviation thus secured.

The mean deviation for the period 1925–1926 was found to be 140,119; for the 1924–1925 period, 149,751; and for the 1922–1923 period, 151,996. These numbers are, of course, no true criterion of the

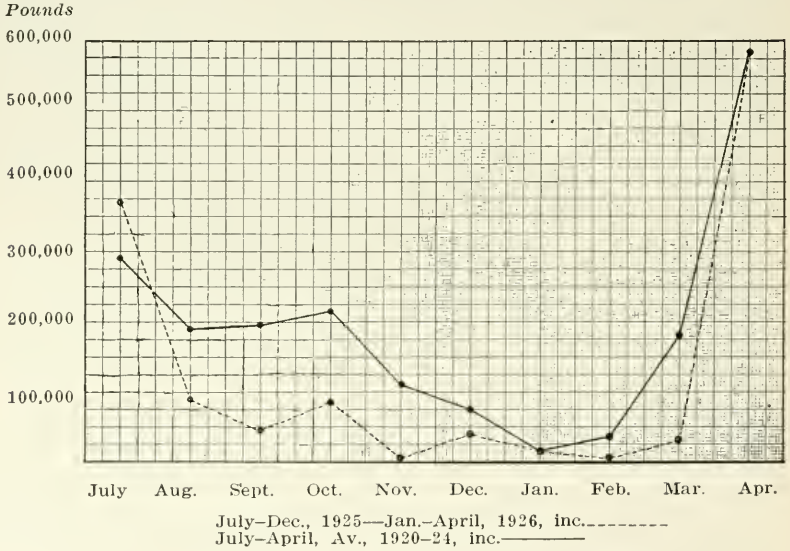


Fig. 4. Average monthly catch of barracuda in Los Angeles County. Local fish only.

comparison since they are merely averages of deviations in series of numbers whose values also vary. The average monthly catch for the 1925–1926 period is 127,329 pounds; for the 1924–1925 period, 317,370 pounds; and for the 1922–1923 period, 198,126 pounds. It can at once be seen that to make a true comparison of variability, the magnitude of the items in each series must be taken into consideration, and the amount of variability in proporation to the average size of the monthly catches in each period determined.

To do this a coefficient of variation was worked out. This was done by merely determining what percentage of the monthly average the mean deviation of each period is, each mean deviation being divided by the corresponding monthly average and multiplied by 100. With the deviations thus reduced to percentages, we have a means of direct comparison of the variability of the three periods. After this is done

we find that the coefficient of variation for the period, July, 1925, to April, 1926, inclusive, is 110.05; for the like period of 1922 and 1923, 76.72; and for 1924 and 1925, 47.18.

The same procedure was followed with the average monthly prices of the same periods, and it was found that the coefficient of deviation for the monthly average prices of the period from July, 1925, to April, 1926, inclusive, is 19.00; for the same period in 1924 and 1925, 15.17; and in 1922 to 1923, 17.22.

Therefore, we may safely say that since the enforcement of the law prohibiting the taking of barracuda with purse seine or round haul nets, the monthly variation in catch and consequently in price is greater than it was before the law was passed and became active.

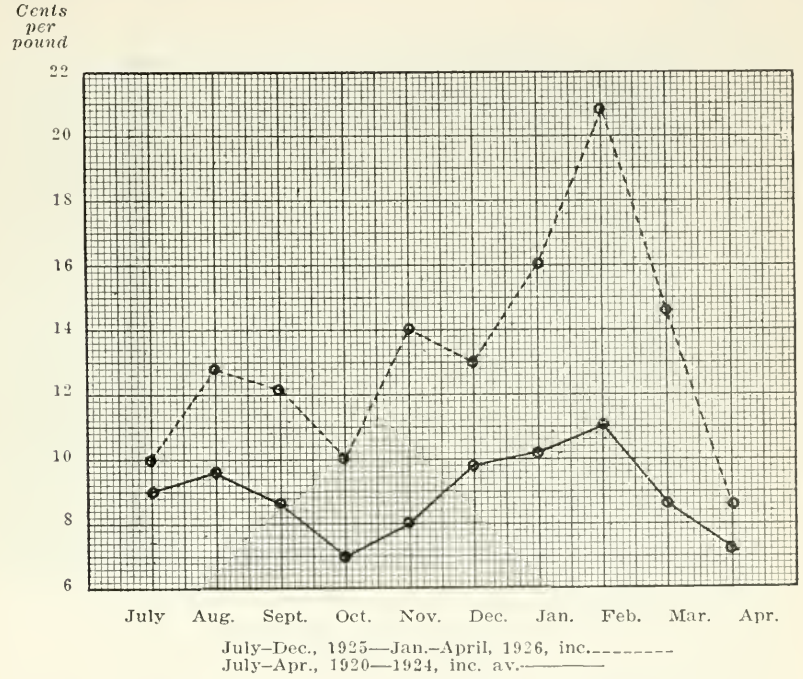


FIG. 5. Average monthly prices of barracuda in Los Angeles County.

We can safely assume that the period of large catches for the gill netters will continue through April, May, June and July, since the same fishing conditions and temperature prevail roughly through this season. Also this period contains the spawning season for the barracuda. So during a complete year under our present law we can expect a period of large catches and moderate prices during April, May, June and July, and a period of small, irregular catches and extremely high prices through the rest of the year.

The reason for the gill netters making large catches in the late spring and early summer appears to be that at that time the barracuda are plentiful close inshore and around the kelp. This may be an inshore spawning migration as this period marks roughly their spawning

season, or it may be a migration to shallower water for feeding purposes, or an influx of fish from the south as the water grows warmer. At any rate, the gill netters do not seem able to keep the market consistently and fully supplied with barracuda during three-quarters of the year.

Both the dealers and fishermen claim that even in the best season for the gill netters their catch is very variable from day to day, as it is greatly affected by the phases of the moon. What little work we had time to do on this portion of the subject seemed to confirm this and indicate that there might possibly be a lunar periodicity in the gill net catches. If so, this might be due to the spawning habits of the fish, a depth, or an inshore migration as they follow the bait fish, chiefly anchovies and sardines, which in turn may migrate following plankton,

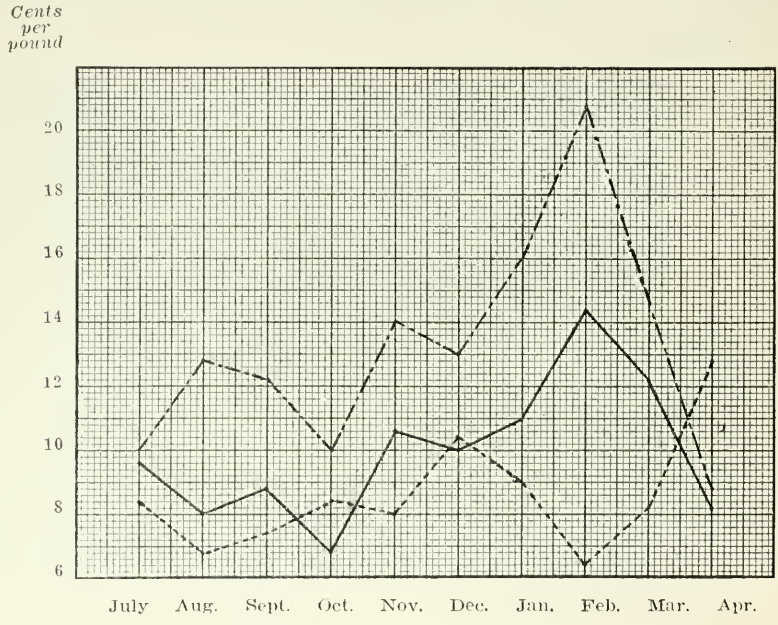


FIG. 6. Comparison of prices of barracuda.

partially controlled by moon phases, or the fish may be able to see and avoid the gill nets in the lighter phases of the moon. We have not had opportunity to do much more than speculate on this part of the problem, but some very interesting and profitable work could be done on it.

The decreased and unstable barracuda catch seems to be having a far reaching effect on species of fish other than the barracuda. The dealers say that since the price of barracuda has gone up to such a high point and the supply is so uncertain, there is a greater quantity of salmon shipped in here from the north and sold than was formerly the case. The barracuda used to be their stable fish, one on which they could guarantee delivery, but now the salmon of the north can successfully compete with the barracuda here in price and certainty of delivery.

Improved cold storage facilities at San Pedro would help them greatly to meet that competition, but it does seem strange to have frozen fish shipped four or five hundred miles to a place where fish are as abundant as they are in the waters adjacent to San Pedro.

Also a greater demand for yellowtail, white sea bass and halibut is created by a shortage of barracuda, as these fish are sold to the same class of trade as the barracuda. Besides the added incentive to catch the above mentioned fish, an additional drain is put on the yellowtail and white sea bass, because when the purse seiners are not allowed to catch barracuda the only fish left for them, when the blue-fin tuna are not plentiful, are the yellowtail and white sea bass. Therefore we can expect the purse seiners to devote more of their energies to catching these fish.

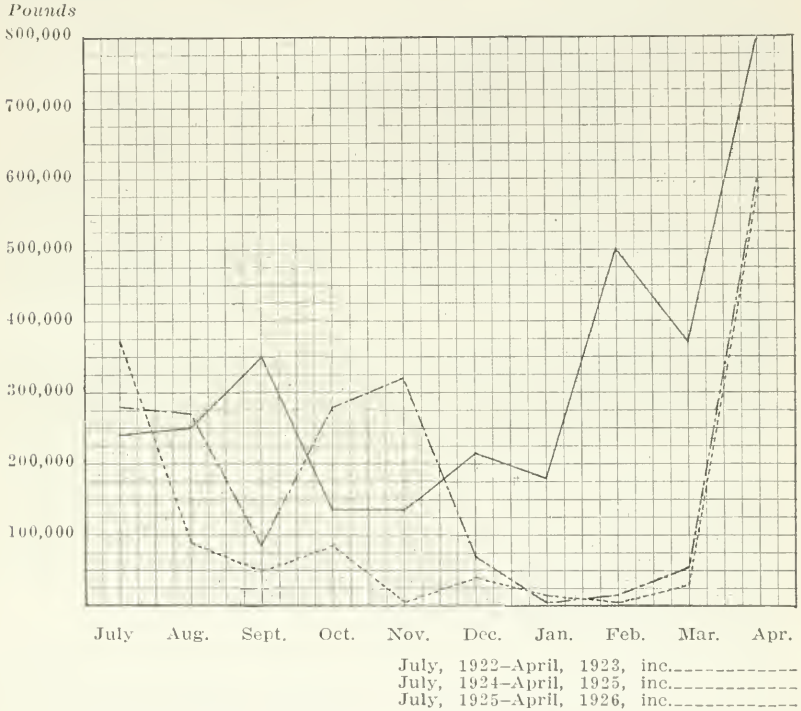


FIG. 7. Catch of barracuda in Los Angeles County. Local fish only.

The added numbers of gill nets and gig boats in local waters also make another hazard for the yellowtail and white sea bass, as yellowtail are often caught when gigging for barracuda, and small fish of both varieties are often brought in by gill netters setting for barracuda. From what superficial knowledge we have on the subject, it does not appear that the white sea bass fishery, especially, is able to stand any added strain, even as well as the barracuda could.

There is small doubt but that purse seining is a wasteful method of taking barracuda, because of the undersized fish gilling in the seine, or being hauled up on deck along with larger fish or being injured when

the net is merely being pursed. However, gill netting as well as purse seining, may destroy quantities of fish that can never be used for human consumption because of the large losses of gilled fish eaten by sharks and sea lions. The gill netters themselves say that they frequently lose from 50 to 75 per cent of the fish gilled, by sea lions eating the fish from the nets. They haul in their nets only twice a night usually, and sometimes find nearly the whole catch destroyed. Of course, this is more an argument against the sea lions than it is against the gill netters.

In order to suggest any certainly intelligent legislation in a fishery, one should have a good idea of the life history of the species in question and know to what extent depletion of the species has taken place. In the case of the barracuda we lack this information, but when as much as we know concerning the species and the economic conditions of the fishery and an entire year's catch is considered by monthly totals, a possible solution of the problem suggests itself. There is a period of four months, April. May, June and July, when the gill netters and gig boats are able to adequately supply the market. During the balance of the year the catches are small and irregular, causing high prices and a shortage of barracuda in the market.

If the purse seiners were allowed to fish for barracuda throughout the year except during the months of April, May, June and July, the monthly catches would be more nearly equalized and be more stable, and there would not be such a shortage of fish during the greater part of the year when the gill netters are unable to take fish consistently or in good numbers.

This arrangement would do away with the rather wasteful purse seine method of taking the fish when the more economical methods will suffice, and allow the purse seiners to supply the market with barracuda when the small boat fishermen are unable to do so. Also, it would keep the price up enough through the entire year so that the small boat men can make a living, as it was only during the four-month period of abundance that the purse seiners so flooded the market that it did not pay the small boats to bring in their fish. The barracuda would be afforded some protection then when they are abundant and close in shore and when they are spawning, as their spawning season falls in the four-month period of April, May, June and July.

No great hardship would be worked on the purse seiners as the blue-fin tuna usually arrive in our waters some time in May and that fishing continues throughout the summer. With the suggested four months' closed season for purse seiners on barracuda, the purse seiners would be able to have a paying business and catch fish when the other people are not able to do so, and also the small boat men would not be put out of business by a flooding of the market in the season of great abundance of fish. The barracuda would receive some protection during their spawning season, a wasteful method of fishing would be eliminated when it is not needed, and the purse seiners upon whom we depend to bring a large part of our winter supply of fish from Mexico when our local fisheries are at their zero point, would not be in danger of having to cease operation.

SUMMARY.

Since the enforcement of the law prohibiting the taking of barracuda in purse seines, the bulk of the fish are caught in gill nets. The total catch has diminished and the price has risen. The monthly catch and consequently the average monthly price are more variable.

The shortage of barracuda and increased fishing by purse seiners will probably put a heavier strain on the white sea bass, yellow tail and halibut fisheries, which they can not well stand.

The period when an adequate supply of barracuda can be brought in without the aid of purse seines is only four months—April, May, June and July

A possible solution of the problem is to allow the purse seiners to fish for barracuda all year except April, May, June and July.

STRIPED BASS AS I KNOW THEM.

By C. E. Hubback.

I find the striped bass a very contradictory fish, bold and shy by turns. When feeding, nothing seems to alarm them. They will often pass close to a person, or swim around a boat without any apparent fear. At other times, the mere shadow or sound of a plug as it flies through the air will be sufficient to scatter an entire school.

Bass often travel in schools when not feeding. I have seen them stringing along the bottom, heads all one way, or lying in the shallow water on the weedy edges in the moss, apparently resting. At such a time, I have never had any luck fishing with fresh bait, nor could I excite them to action by plug casting. Again, I have found a school of bass splashing about as in play, and when so employed they refused bait. If I persisted in fishing they all disappeared.

Several curious experiences have convinced me that bass are able to cast a phosphorescent glow when feeding at night. I was camping by a brackish lagoon one very dark night when I heard a bass rush something in the weeds not ten feet from where I was sitting. Naturally, I watched the place from which the noise came, and was amazed to see a glow on the water, sufficient to enable me to see the outline of weeds and grass clearly, and even the bubbles on the water three or four inches from the light. After the glow I heard the fish rush and make that popping or sucking sound. The entire performance was repeated six times. Another time, about the same thing happened to me on the Salinas River. I should be glad to hear from others on this subject as I was afraid of being doubted, so hesitated to tell of my experience.

Like all other fish fans I have my favorite hook-up. I like a number 6 twelve-pound test line, dyed a light brown for about fifty feet, with a small hook, about a number 0000, cut so short as to be entirely hidden by the bait. I like about a foot and a half of line for a snell, wrapped on the hook with silk, and secured with shoemaker's wax. If there is little or no current, I omit the sinker. Where it is necessary to use one, I prefer a light sliding sinker. I make a very satisfactory slide by cutting copper tubing three-eighths of an inch long and flaring out each

end with a center punch. Tie the sinker line around this piece of tubing with the sinker about eighteen inches away from the slide, or the same length as the hook snell. Slip the end of your line through the piece of tubing. Cut some leather washers about half an inch in diameter and punch a small hole in the center of each. Next run your line through these washers, then fasten on a swivel. To the other end of the swivel fasten on your hook snell. You now have a sliding sinker rig such as I use.

You will note that should a bass pick up your bait, the weight of the sinker will not be felt. With plenty of slack line, and the snell hook in the bait, your fish can move away unsuspicious of either sinker or hook. This, I find, gives him time to swallow the bait. The result is that most of the fish I catch with bait are hooked far back in the mouth.

One hook on a line is all I use—a double is seldom hooked and hardly ever landed. Why take the chance of losing your tackle or having a nice fish break away with a hook deep in his mouth to die a slow death.

Monterey sardines seem to be the best bait in our waters. Cut them up in pieces three-quarters of an inch long, just large enough to cover the hook well. Bass will swallow a small piece of bait at once, whereas a large piece has to be crushed so that the hook is often detected. Bullheads and other small fish are often good, either alive or dead. I have taken bass on sand-crabs, sand-fleas and sand-worms. I once took a twelve-pound striper on a piece of a blackbird.

The early morning (until about 9 o'clock) and the late afternoon and evening are the times I find the best to fish lagoons and rivers where there is little current. When fishing still water it always pays to keep out of sight and as quiet as possible. Try it once. Give the bass plenty of time to swallow the bait, then set the hook, not with an awful heave, but rather with a precise snap when the line is drawn taut by the fish. Don't horse your fish—let him run when he wants to. Just keep a little strain on the line. The time to take back line is when the fish eases up. Look out for a last rush when the fish sees you, or your boat. He will always make one more rush to escape, and if you are not on the alert, he will get away. Many fish are lost on this last rush. I do not gaff a fish unless it is necessary to lift it into my boat. When gaffing a fish, lift it on the point of the gaff hook. Do not strike down on it. You are likely to knock the fish off, particularly if it is lightly hooked.

Please do not become inhumane and club the poor fish to death like a holdup man. There is a better way to dispatch the fish, which leaves it in better condition. Lift the gill cover and with a sharp knife cut the skin between the gills and the body. Hold the fish up by the tail for a minute or two to let it bleed freely. Be sure to dress the fish as soon as possible, after catching. Roll it up in a wet sack and keep it in the shade or bury it in the sand to keep it cool. You will find that fish scale much easier if they are kept moist.

So much for bait fishing, now for the lures. There is no doubt that more bass have been taken on the red-head Basoreno than any other lure. Other plugs prove successful at times. A surprise minnow is a good one to run tandem with a red-head. Hook them up three feet apart, the surprise minnow in front. A plug with green on it is often

good in daylight. I have taken bass on an Al. Foss, Little Egypt pork rind spinner, substituting a strip of red cotton for the pork rind. The Shannon twin spinner will attract them sometimes. I have made several good catches with a phantom minnow. When casting a lure for bass in still water, never cast into or over a school of bass if you see them. Drop your lure near them so as to excite them without giving them a chance to see what it is that fell into the water. Do not always blame the line, or the dealer who sold it to you should you lose a fish by the line parting near the hook, when you know you have not been rough with the fish. Carefully observe the next bass you catch. About the center of the gill cover you will see a very sharp bony edge hidden there that can cut any line that comes in contact with it. Fish are frequently lost in this way. Test your hook snells often when fishing, and always after fighting a fish. In doing this you will save quite a few hooks and fish. Never fish in a hurry. I find that patience and perseverance are very necessary to become a good bass fisherman.

BELIEVE IT OR NOT

By August Bade.

The question is often asked, "Does the male quail share the nest with the hen during the incubation period?"

A few years ago a farmer called one day at the Game Farm in Washington to let me know that he had a brood of Hungarian partridges hatched from some eggs that he had picked up during the alfalfa cutting. He wished me to come and get them as he had no way of taking care of them. In covering the valley for setting hens many friends had been made among the farmers and they had been advised that when nests of any of the game birds were found during farm operations such as cutting hay and plowing, they would be doing a good turn if they put the eggs under a hen for safe keeping until someone from the Game Farm had time to come and get them. This was one of the many examples of that friendly cooperation that resulted in the saving of many nests of eggs.

While I was there getting the little freckle-faced Hungarians only a day old, the farmer's young son of about six years whispered to me, "I knows where is a quail's nest." There were quite a number of bob-white quail in that particular section of the valley and as the farm was in need of breeding stock of this variety, it looked like a very good time to get a clutch of eggs. After some little search among some small willows, sure enough there was the nest and the hen was on the eggs at the time. We were so very near the nest that I felt sure she was setting because at any other time a bird will not permit you to come so close to the nest without flying away. Several ideas passed through my head in quick succession, among them: Could a nest be moved and the bird still claim it? I had never tried the experiment. This was the opportune time. We quietly backed away from the nest and went to the house, only a few rods away, to see what the farmer had that would aid us in taking the mother quail as well as the nest and its precious eggs. An old galvanized washtub was the best looking net I could see. I took the tub and walked within a few feet of the

nest and quietly tossed the tub over bird, high grass and all. The scheme worked, for the bird did not fly away. The tub was pressed down quietly to be sure of no accident, and I ran my arm under the edge of the tub and after some little skirmishing with one hand the bird was firmly secured. The tension of the last few seconds was immediately released as I drew the bird out to discover to my surprise that we had caught the father bird instead of the mother. Possibly this was only one of those exceptions that mathematicians say prove the rule.

A few months later we were shipping the breeding stock of that season, as was the custom at that farm. No birds were held more than one season for breeding purposes. There were eighteen pens of bob-white breeding stock to be liberated. The boys were instructed to catch and crate them for their ride of 200 miles where they were to have a new home and plenty of elbow room. These birds were all mated in pairs with just one pair to the pen. There should have been thirty-six birds, but a careful count revealed only thirty-five. Where was the other bird? It must have been overlooked in the pen. One of the boys explained that in one of the pens he found but one bird. Possibly the other one had died or had been caught by one of the many rats that at times gave much trouble among the small birds. The incident was closed for the time and the rest of the birds sent on their way rejoicing. But the incident did not stay closed, as in about ten days these pens were being cleaned up and the cover which had been their protection during the breeding season was raked out and burned. To make a long story short, in one pen was found the father bird and six little bob-whites apparently well and doing nicely. Two other pens were opened, giving them more room, and the young birds came to maturity with but a single parent—and that the father. At the time we were catching the quail for shipment it happened to be his turn on shift and as it was nearing the time of hatching he was simply running true to form in standing by the eggs, or rather sitting on them, while his little mate was being netted and removed from the pen. This instinct of many birds to cling closer to the eggs as the hatching day draws near is very marked. The trait is more noticeable in love birds, or that class of birds that multiply by mating in pairs only.

To further illustrate this point let me cite an incident of the Hungarian partridge. At the time, I was interested in finding a few of these eggs in order to do some experimenting with them to determine if they would respond to the same living conditions under which the Chinese pheasant had been raised. A farmer had run onto a nest and called me as he had been asked to do. In company with the man I went to the spot indicated by him, along an old fence row. There was the bird on the nest. I had no desire to get the bird but only the eggs, so walked rather boldly up to her, expecting she would leave the nest at any moment, as these birds are by nature very hard to approach in their natural haunts. She stayed by the nest until I quietly shoved her off with my hand. Her clutch of twenty-two eggs hatched four days later under a bantam hen after being moved a distance of twenty-five miles.

INTERESTING BOOKS ON FISH, FISHERIES AND RELATED SUBJECTS.*

This list is intended to help local and school librarians to select books for their collections, and to suggest interesting and profitable reading on the history of fisheries, conservation, and marine biology. All the books are perfectly comprehensible to the general reader, and suitable for reference use by students as well. Unless otherwise specified, the quoted annotations given are taken from the author's preface or from the publishers' announcements. Others are supplied by the compiler.

All books except those marked with an asterisk are in the possession of the California State Fisheries Laboratory at Terminal Island, California, and may be consulted there by anyone seriously interested.

ON SHORE LANDS AND THEIR FAUNA.

1. Arnold, Augusta F. The sea-beach at ebb tide. N. Y., Century, 1916. 490 p., more than 600 illus., 8vo. No bibliog. $4.50.

This book will help the amateur or student to identify marine algæ and invertebrates found on the beach. Although only Atlantic coast species are figured and described, many of the same genera are found on the west coast. "Technical phraseology has been avoided as much as possible, even at the expense of conciseness and precision."

2. Carey, Alfred E., and F. W. Oliver. Tidal lands: a study of shore problems. London, Blackie, 1918. 298 p., illus., Cr. 8vo. No bibliog. $3.00.

"This work is primarily concerned with those problems which underlie the maintenance of coastal and riparian lands, and, as a factor in such control, the extent to which horticulture may be enlisted in the cause of conservation."

3. Flattely, Fred W., and C. L. Walton. The biology of the seashore. N. Y., MacMillan, 1927. 336 p., illus., 8vo. Bibliog. pp. 315-323. 16s net.

"The main idea underlying the present work is to treat the plants and animals inhabiting the seashore from the ecological standpoint: to show, that is, how they interact, and, in particular, to demonstrate the influence of the environment upon their structure, functions, habits, and general reactions." Chiefly British species are treated, but some foreign forms are included. On pages 250-251 reference is made to the California grunion, a fish with tide-controlled spawning habits, the life-history of which has been worked out in Fish Bulletins Nos. 3 and 10 of the California Fish and Game Commission.

"While no attempt has been made to shun technicalities, care has been exercised that they should not be multiplied unnecessarily."

4. Johnson, Douglas W. Shore processes and shoreline development. N. Y., Wiley, 1919. 584 p., 149 figs., 73 full page plates, 8vo. Bibliog. pp. 533-551. Lists of references at chapter ends. $6.00 net.

"A valuable text and reference for teachers and students of geology and geography, and for engineers engaged in marine work. A thorough

*Contribution No. 64 from the California State Fisheries Laboratory, compiled by Ruth Miller Thompson, Librarian, California State Fisheries Laboratory.

discussion of the dynamic forces operating along the coast is given, as well as an elaborate analysis of the marine cycle and a description of shore forms."

5. *Johnson, Myrtle E., and Harry J. Snook. Seashore animals of Pacific coast. N. Y., MacMillan, 1927. Illus., 8vo. $7.50.

Forthcoming. This ought to be the best popular guide to shore invertebrates of the west coast available. At present reference to many scattered scientific publications is necessary before identifications can be made.

6. Marmer, H. A. The tide. N. Y., Appleton, 1926. 282 p., illus., 8vo. No bibliog. $2.50.

"The first comprehensive and authoritative work on the tide written for the general reader. * * * It presents in a thoroughly readable style and without the use of mathematics, the latest knowledge concerning tides. * * * A book of fascinating content, handled with much descriptive skill."

ON SHELLFISH, ETC.

1. Keep, Josiah. West coast shells. Also a chapter on the fresh water mollusks of the Pacific slope by Harold Hannibal. Rev. ed. San Francisco, Whitaker and Ray-Wiggin, 1911. 346 p., illus., 8vo. No bibliog. $2.50.

The earlier edition (1904) contains a list of references to literature, arranged by species, which is lacking in the second. The 1911 edition, however, contains a biographical index, a glossary and a checklist of species.

This is a popular handbook, not an exhaustive scientific compilation.

2. Kellogg, James L. Shellfish industries. (American Nature Series, Group IV—Working with nature) N. Y., Holt, 1910. 361 p., illus., 8vo. No bibliog. $1.75.

An account of the food mollusks of the United States, chiefly written "for those who eat them, for those who may be or desire to become directly interested in their culture, and for those who may have an interest in the biological problems involved in their artificial control." Particular emphasis on oysters, clams, and scallops. A chapter on "ciliary mechanisms" presents the results of original research by the author.

3. Oldroyd, Ida S. The marine shells of the west coast of North America. Vol. I. Stanford University Publications, University Series, Geological Sciences, Vol. I, No. 1. Stanford University Press, 1924. 247 p., 57 pls., 8vo. Bibliog. pp. 233-235. $4.

"The purpose of this work is to bring together the marine shells of the west coast of North America from the Arctic Ocean to San Diego, giving the original description, whereabouts of the type and type locality, geographical and geological range. * * * All the common California species are figured, many of them for the first time. * * * It is the purpose of the writer to make this work useful to the amateur as well as to the professional conchologist." The classes Pelecypoda (bivalves) and Brachiopoda, only, are treated in this volume. Volumes dealing with the other classes are expected.

4. Shipley, Arthur E. Pearls and parasites. London, Murray, 1908. xv, 232 p., 10 illus., 8vo. Bibliog. pp. xiii-xv. 7s 6d net.

A collection of short popular essays and lectures on various biological subjects. Those of interest for this list are on "Pearls and parasites," "The depths of the sea," and "British sea-fisheries."

ON THE NATURAL HISTORY AND BIOLOGY OF FISHES.

1. Jordan, David Starr. The complete book of fishes. N. Y., Appleton, 1925, xv, 773 p., 673 illus. and 18 col. pls., large 8vo. No bibliog. $7.50 net.

This has practically the same text as the old edition, which is entitled "Guide to the study of fishes" and was published in 1905, but the colored plates are new. Those of the Pacific salmon and trout are especially good.

"In this volume the writer has tried to compress all that an educated man is likely to know, or to care to know about fishes. * * * Each one of the food and game fishes of the United States is treated with considerable fullness."

2. Kyle, Harry M. The biology of fishes. London, Sidgwick and Jackson, 1926. 412 p., illus., 8vo Bibliog. pp. 373-387. 16s.

This is reviewed in "Science" Vol. 63, for April 23, 1926, p. 428, by David Starr Jordan, who calls it "very complete and useful; in touch with the latest investigations in anatomy and physiology."

3. Meek, Alexander. The migrations of fish. London, Arnold, 1916. xx, 427 p., 12 pls. 128 illus., and maps, Demy 8vo. Bibliographical footnotes and short lists of references at ends of chapters. 18s net.

Presents a systematic review of the results of investigations on the migrations of fish, and states the known facts about the distribution of various species. Not all biologists attribute the same importance to migrations as a factor in fish life, as does Mr. Meek.

4. Menzines, W. J. M. The salmon; it's life story. London, Blackwood, 1925. xii, 211 p., illus., Demy 8vo. Bibliog. pp. 206-208. 21s net.

An account of the life-history studies on salmon in Scotland, especially those made by reading the age from the scales. Authentic, quite readable.

5. Pearse, A. S. Animal ecology. N. Y., McGraw-Hill, 1926. 417 p., no illus., 8vo. Bibliog. pp. 383-412. $4.00.

The first comprehensive and authoritative book in its field. A general survey, dealing with physical, chemical, and biological factors, animal life in the ocean, in fresh water and on land, intra- and inter-specific relations, the relations of animals and plants, the color relations of animals and the economic aspects of ecology.

ON FISHERIES AND FISHERY INDUSTRIES.

1. Cobb, John N. The canning of fishery products. Seattle, Pacific Fisherman, 1919. 217 p., illus., 8vo. No bibliog. $7.50.

"The book is written for the cannery operator, and not for chemists or bacteriologists, and as a result has been made as non-technical as possible."

2. Gibbs, W. E. The fishing industry. London, Pitman, 1922. 135 p., illus., 12mo. No bibliog. 4s.

A good short account of the British sea fisheries, chiefly. Chapters on habits of fishes, fishing methods, the herring and cod fisheries, trawling, shellfish, whaling, the curing of fish, and the food value of fish and fish products.

3. Green, Neal. Fisheries of the North Sea. London, Methuen, 1918. 178 p., map, 1 pl., 8vo. No bibliog.

An intelligent survey of the North Sea fisheries, their history, value, possibilities and the bearing of scientific investigation on their development, written by a "practical man." A chapter comparing American and English fisheries is included.

4. Hérubel, Marcel A. The sea fisheries: their treasures and toilers. Translated by Bernard Miall. Ed. 2, 1920. London, Unwin. (Edition 2 has 3 illus., Demy 8vo. Bibliog. pp. 353-394) (Edition 1, 1912, has 366 p., no illus., Demy 8vo. Bibliog. pp. 353-358).

Appendix contains a list of principal fishing grounds and ports. Calls attention to the "lamentable conditions" of the French marine fisheries, and seeks the most efficacious remedies. Chapters on edible species, fishing grounds, causes of depletion, fishery laws, science and the fisheries, fishing boats and methods, the fisheries of the great fishing nations, markets, etc. A good general book on sea fisheries (exclusive of those for shellfish and crustaceans).

5. Howell, G. C. L. Ocean research and the great fisheries. Oxford, The Clarendon Press, 1921. 220 p., illus., 8vo. Bibliog. pp. 208-211. 18s net.

A survey of the main fisheries in the North Sea, emphasizing the relation of scientific research to their proper regulation, and pointing out the importance of adequate statistics.

6. Jenkins, James T. The sea fisheries. London, Constable, 1920. xxxi, 299 p., illus., 8vo. Bibliog. pp. 284-288. 24s net.

Collects in a single volume discussions of many branches of fishery research and administration; treats of statistics, fishing methods, legislation, life-history of representative species, shellfish, education of fishermen, value of scientific research, colonial fisheries, etc. The best book of its kind on British fisheries.

7. McFarland, Raymond. A history of the New England fisheries. N. Y., Appleton, 1911. 457 p., 3 maps, 8vo. Bibliog. pp. 338-363. $2.00.

"Aims to show the development and the importance of the New England fisheries from pre-colonial days to the present time." Little attention is given to the whale fishery since this is adequately treated in other books.

8. Tressler, Donald K. Marine products of commerce. N. Y., Chemical Catalog Co., 1923. 762 p., 300 illus., 8vo. Good lists of references at the ends of chapters. $9.00.

"This book is designed for both the scientific and the practical man; it attempts to give the chemist and the biologist a general survey of the fishery industries, pointing out their relative importance, indicating their location, and describing the methods in common use."

Concerns the "acquisition, handling, biological aspects, and science and technology of the preparation and preservation" of marine products. The best and most comprehensive book in its field.

In the appendix are given statistics of the U. S. fisheries, and a list of the common names and descriptions of commercially important marine animals in the waters of the U. S. and Alaska.

ON AMERICAN FISHES.

1. Goode, G. Browne. American fishes; a popular treatise upon the game and food fishes of North America with special reference to habits and methods of capture. Ed. 2, revised and enlarged by Theodore Gill. Boston, L. C. Page, 1903. lxviii, 562 p., 6 col. pls., and numerous illus., 8vo. No bibliog. $6.00.

There is an index of common as well as of scientific names. Lists of the fishes of the different regions are given. Entertaining as well as authoritative. Frequent references to the observations of early anglers, and quotations about fish from poetry, enliven the text.

2. Jordan, David Starr and B. W. Evermann. American food and game fishes. N. Y., Doubleday, 1908. i, 572 p., illus., large 8vo. No bibliog. $4.50.

"A popular account of all the species found in America north of the equator, with keys for ready identification, life histories, and methods of capture." This book aims to be "useful and entertaining to anglers, to commercial fishermen and dealers in fish and fishery products, to teachers and others who wish to inform themselves regarding our vast array of food and game fishes, and to the multitude of intelligent men and women who have an interest in nature and nature study."

ON WHALES AND WHALING.

1. Beddard, Frank E. A book of whales. (The Progressive Science Series) London, Murray, 1900. 320 p., illus., 8vo. No bibliog. $1.75.

A comprehensive general work on whales. It attempts to illustrate the biological generalization of the intimate relationship between structure and environment by means of this group of animals.

2. Jenkins, James T. A history of the whale fisheries. London, Witherby, 1921. 336 p., illus., 8vo., Bibliog. pp. 318-331. 18s net.

The main facts of the progress of the whaling trade have been marshalled in this book. Conservation is urgently counselled.

ON FISH COOKERY.

1. Spencer, Evelene, and John N. Cobb. Fish Cookery. Boston, Little, Brown, 1921. 364 p., no illus., 8vo. No bibliog. $2.00.

"Six hundred recipes for the preparation of fish, shellfish and other aquatic animals, including fish soups, salads, entrees, and accompanying sauces, seasonings, dressings and forcemeats."

ON THE HISTORY OF FISHING.

1. Radcliffe, William. Fishing from the earliest times. Ed. 2, rev. N. Y., Dutton. 1926. [Ed. 1 (1921) has xvii, 478 p., illus., Med. 8vo.] 21s net.

This is a scholarly but very entertaining book on the history of angling in Greece, Rome and ancient Egypt, Assyria and China. The revised edition is said to contain a bibliography, and several new illustrations.

STORIES ABOUT SEA ANIMALS.

1. Bullen, F. T. Denizens of the deep. N. Y., Revell, 1904. 430 p., illus., 8vo. No bibliog. $2.50.

"Intimate personal details of the every-day lives" of sea beasts, such as whales, walrus, seals, turtles, giant squids, albacore, mackerel, etc. "Based very largely upon personal observation, buttressed by scientific facts and decorated by imagination."

ON OCEANOGRAPHY AND ITS RELATION TO FISHERIES.

1. Fowler, G. Herbert. Science of the sea. London, Murray, 1912. 470 p., illus., Cr. 8vo. Bibliog. pp. 434-437. 6s net. A revised edition is in preparation.

This book was prepared by the Challenger Society and is addressed primarily "to those who are willing to take observations, but fear that a lack of scientific training will render their work or their collections worthless." Elementary. "The object of the volume is severely practical * * * written in language which, so far as possible, takes no previous scientific training for granted."

Appendices contain a list of the marine stations of the world, a list of the firms dealing in oceanographic supplies, and synoptic classification tables of plants and animals.

2. Herdman, William A. The founders of oceanography and their work; an introduction to the science of the sea. London, Arnold, 1923 xii, 340 p., 29 pls., Demy 8vo. No bibliog. 21s net.

"The book is one of great freshness and charm, much of which is due to the impress of the author's personality. * * * He has proved himself an excellent advocate of his young science of oceanography."

3. Jenkins, James T. A textbook of oceanography. New York, Dutton, 1921. x, 206 p., illus., 8vo. Bibliog. pp. 199-202. 15s net.

Not unduly technical. Review of modern methods of oceanographical research and their chief results. Designed as a text for use in schools. Chapters on general physiographic features of oceans, deposits and bottom fauna, waves, tides, currents, etc.

4. Johnstone, James. Conditions of life in the sea. A short account of quantitative marine biological research. Cambridge, University Press, 1908, viii, 332 p., 29 illus., 3 maps, 8vo. Bibliog. pp. 316-319. $6.00.

Chapters on life in the sea, the sea fisheries, quantitative plankton investigation, distribution of plankton, the productivity of the sea, bacteria in the sea, the circulation of nitrogen, and conditions of marine life.

5. Johnstone, James. An introduction to oceanography with special reference to geography and geophysics. London, University Press of Liverpool, 1924. ix, 351 p., 64 figs. Bibliog. pp. 337-342. 15s net.

The author aims to deal with oceanographical science in a general way and to give a summary account of marine science from the physical side.

6. Johnstone, James. A study of the oceans. London, Arnold, 1926. viii, 216 p., maps, 8vo. Bibliog. p. 208. $3.75.

This is reviewed in "Nature" for July 17, 1926, on page 79. It "reads like a series of semi-popular lectures" on modern oceanography, the geological history of the ocean beds, and early contributions to geographical science.

7. Murray, John and Johan Hjort. The depths of the ocean. London, Macmillan, 1912. xx, 821 p., profusely illus., 8vo. No bibliog. 28s net.

This includes a general account of the cruise of the Norwegian steamer "Michael Sars" in 1910, and in addition it is a fairly complete treatise on recent advances in oceanography. Though not absolutely up to the minute, it is probably the most comprehensive as well as the most interesting book on oceanography yet published.

8. Thomson, C. Wyville. Voyage of the Challenger. The Atlantic. A preliminary account of the general results of the exploring expedition 1873-1876. N. Y. Harpers, 1878. 2 vols. No bibliog. Vol. I has xx, 391 p., 110 illus., 8vo.; vol. II has 340 pages, illus., map, plates, 8vo. $12.00. (Out of print.)

"One of the most deeply interesting and fascinating books ever published."—*Nature.*

Appendices contain meteorological tables, tables of depths and sea temperatures, and tables of specific gravity determinations.

EDUCATIONAL FILMS AND LANTERN SLIDES OF THE CALIFORNIA FISH AND GAME COMMISSION.

The following slides and motion picture films may be obtained free of charge by fish and game protective associations, schools, boy scouts, farm bureaus and other responsible organizations. They depict the fish, bird and animal life of the state and are designed to stimulate an interest in the conservation of our natural resources.

A capable lecturer is available to explain the pictures, give useful information as to the life and habits of the different animals shown, and to emphasize the need of conserving wild life resources.

As a part of the Commission's educational program, these pictures and the services of the lecturer are furnished free of charge, but it is expected that a suitable hall, lantern and competent operator will be provided. Address all communications to the Fish and Game Commission, Postal Telegraph Building, San Francisco, California.

MOTION PICTURE FILMS (1000-FOOT REELS).

Reel 1A. **Life History of Steelhead Trout.** (a) Hatchery operations. (b) Fishing scenes on Williamson River. (Salisbury film.)

Reel 1B. **Life History of the Steelhead Trout.** (a) From the artificial spawning to the hatching of the eggs and catching of the adult fish in a mountain stream. (b) Valley fishes.

Reel 1C. **Life History of Steelhead Trout.** (a) Hatchery operations. (b) Catching large steelhead on the Eel River. (c) The angler at work. (Prizma colored film.)

Reel 1D. Similar to above. (Prizma colored film.)

Reel 2A. **The Salmon, King of Fishes.** (a) Spawning operations on the Klamath River. (b) Mount Shasta fish cultural operations.

Reel 2B. **The Salmon, King of Fishes.** (a) Spawning operations on the Klamath River. (b) Fishing scenes on Klamath River. (c) Klamath Indian dances.

Reel 3A. **The Tuna Fishery at San Pedro.** Showing the whole industry from the capture of the fish to the finished canned product.

Reel 4A. **The Monterey Sardine Fishery.** (a) Sardine boats. (b) Canning methods.

Reel 5A. **Cormorant, White Pelican and Heron Rookeries.** At Clear Lake, California, showing nests, eggs, young and adults.

Reel 6A. **Nesting Birds of the Farallone Islands.** (a) A whaling vessel in action. (b) Murres and puffins. (c) Sea lion and seal rookeries.

Reel 6B. **Nesting Birds of the Farallone Islands.** Showing cormorants and western gulls.

Reel 6C. **Birds of the Farallone Islands.** Showing murres, gulls and sea lions, brown pelicans.

Reel 7A. **Predatory Birds.** Showing home life of osprey, bald eagle, golden eagle, turkey buzzard and horned owl.

Reel 8A. **California Waterfowl.** (a) Ducks and geese in the Sacramento Valley. (b) Ducks on California's oldest game refuge. (c) Nesting waterfowl.

Reel 8B. California Wildfowl. (a) Mallards, pintail, canvasbacks. (b) Geese in flight. (c) Whistling swans. (d) Clapper rail.

Reel 9A. Upland Game Birds. (a) Bandtailed pigeon. (b) Sierra grouse. (c) A California quail hunt.

Reel 10A. California Song Birds. Showing bush-tit, house wren, humming birds and stellar jay.

Reel 10B. Non-Game Birds of California. Black crowned night heron, russet-backed thrush, chickadee, western mocking bird.

Reel 11A. Forest Animals. (a) Black bear. (b) Treeing and roping of mountain lion.

Reel 12A. Game Mammals of California. Showing bear, deer and elk.

LANTERN SLIDES.

COMMON BIRDS.

57. Bittern, showing protective coloration.
17. Blackbirds, Brewer, young.
18. Blackbirds, red-winged.
36. Bluebird.
37. Bluebird, western, at nest.
93. Bush-tits.
28. Butcherbird.
6. Buzzard, turkey, young.
7. Buzzard, turkey.
43. Chickadee, Santa Cruz, in Golden Gate Park.
59. Condor, California.
51. Creeper.
15. Crow.
58. Eagle, bald.
2. Egrets.
77. Flicker at nest.
78. Flicker at nest.
79. Flicker and young in nest.
80. Flicker leaving nest.
81. Flicker and young in nest.
82. Flickers, young on tree.
83. Flicker, feeding young.
10. Flicker, red-shafted.
11. Flicker, red-shafted at nest.
42. Goldfinch, green-backed.
45. Goldfinch, green-backed on nest.
55. Grebe, pied-billed.
56. Grebe, pied-billed and nest.
75. Grosbeak, black-headed.
70. Grosbeak, evening.
3. Gull, herring.
40. Hawk, Cooper.
85. Hawk, marsh.
5. Hawk, red-tailed.
94. Hawk, sparrow, male.
72. Hawk, western red-tailed, in defense posture.
1. Heron, great blue.
16. Heron, great blue.
50. Junco, slate colored (snow bird).
13. Kingbird.
84. Kingfisher, belted, young.
92. Lazuli bunting male.
23. Linnet.
24. Linnet, on nest.
25. Linnet, feeding nestlings.
21. Meadowlarks.
22. Meadowlark, western, young.
53. Meadowlark, western, young in nest.
34. Mockingbird.
76. Murre, California, colony.
74. Nuthatches.
65. Nuthatch, white-breasted and red-breasted.
20. Oriole, Bullock.
19. Oriole, Bullock, nest of.
66. Oriole, hooded, nest of, with two eggs of cowbird.
87. Osprey.
8. Owls, barn, young.
9. Owls, barn, young.
4. Owl, dusky horned.
88. Owl, great horned, on nest.
60. Owls, saw whet.
89. Owl, screech in hollow.
41. Pelican, white, on Clear Lake.
14. Phoebes, black.
46. Roadrunner, on nest.
47. Roadrunner, with lizard.
61. Robin.
35. Robin, western, young.
49. Robin, singing.
12. Sapsucker, red-breasted.
48. Sapsucker, Williamson, at nest.
54. Sapsucker, yellow-bellied.
29. Shrike, on nest.
63. Solitaire, Townsend.
64. Solitaire, Townsend, nest of.
38. Sparrow, English.
38½. Sparrow, English.
39. Sparrow, English.
44. Sparrows, English.
67. Sparrows, song, a pair of.
91 Sparrow, song, feeding young.
52. Swallow, tree, feeding young.
62. Thrush.
27. Towhee, California.
71. Towhee, California.
86. Vulture, California.
68. Warbler, Audubon.
69. Waxwing, Bohemian.
30. Waxwing, cedar.
73. Woodpecker, downy, on food stick.
90. Woodpecker, hairy.
33. Wren, Parkman.
31. Wrens, Parkman, young.
32. Wren, Parkman, on nest.

GAME BIRDS.

237. Avocet and black-necked stilt.
210. Curlew, Hudsonian.
249. Curlew, Hudsonian.
227. Dove, mourning.
219. Ducks, Fulvous Tree, at Game Farm.
201. Duck, mallard.
209. Ducks, pintail.
212. Ducks, pintail, juvenile.
217. Ducks, ruddy.
202. Duck, wood.
202a. Duck, wood.
214. Ducks, Alameda County Infirmary Reservoir, winter of 1914.
215. Ducks on pond at State Game Farm, Hayward, California.
213. Ducks on Lake Merritt.
222. Ducks on lawn, Lake Merritt.
224. Ducks on lawn, Lake Merritt.
223. Ducks flying, Lake Merritt.
225. Ducks at north end of Lake Merritt.
240. Ducks rising from irrigation ditch, Sacramento Valley.
230. Geese, white-fronted and snow.
244. Goose, Canada, old and young.
242. Grouse, sage.
232. Grouse, sage (sage hen).
233. Grouse, sage hen, dancing.
234. Grouse, Sierra.
247. Merganser, "shell drake."
248. Phalarope, Wilson's.
208. Pheasant, ring-neck.
229. Pigeon, band-tailed, nest of.
235. Ptarmigan on snow and on nest.
206. Quail, mountain.
221. Quail, mountain at Game Farm.
203. Quail, valley.
204. Quail, valley.
205. Quail, valley.
216. Quail, valley, with Ruth Dirks.
218. Quail being fed in yard, Elsinore.
211. Rail, California clapper.
236. Rail, Virginia, approaching nest.
228. Sandpiper, spotted.
245. Shoveller.
243. Snipe, Wilson's, on nest.
237. Stilt, black-necked and Avocet.
220. Swan, whistling.
241. Teal, green-winged.
207. Turkey, wild.
231. Widgeon, baldpate and European.
246. Willet.
239. Yellowlegs, greater.
238. Yellowlegs, lesser.

ECONOMIC BIRDS.

303. Blackbirds over Kafir corn.
301. Egyptian corn injured by blackbirds.
302. Kafir corn injured by blackbirds.
304. Barley injured by blackbirds.
316. Barley injured by blackbirds.
317. Barley injured by blackbirds.
318. Butterflies in road.
321. Life history of a butterfly.
311. Meadowlark, western.
306. Meadowlark with cutworm.
305. Diagram showing per cents of food for the year of a Western Meadowlark.
307. Mandibles of crickets from stomach of meadowlark.
308. Stomach contents of meadowlark.
309. Stomach contents of western meadowlark.
314. Stomach contents of western meadowlark—beetles.
315. Diagram showing food of western meadowlark by the month.
310. Holes bored in grain field by a meadowlark.
323. Barn owl with pocket gopher.
322. Stomach contents of western robin.
312. Zeiss binocular used in stomach examination.
313. Method of estimating stomach capacity.

COMMON MAMMALS.

502. Chipmunk, alpine.
507. Opossum.
509. Opossum.
510. Otter, river.
503. Porcupine.
505. Rabbit, California jack.
508. Rabbit, white-tailed jack.
511. Raccoon.
Raccoon climbing tree.
501. Rat, kangaroo.
504. Squirrel, red or chickaree.
512. Skunk, little spotted.
506. Whale, cutting up, at Moss Landing whaling station.
513. Wild cat in trap, Mendocino County.

BIG GAME MAMMALS.

641. Antelope herd on Mt. Dome.
643. Antelope, prong-horned, lying down.
625. Bear, black, near Camp Ahwahnee, Yosemite Valley.
639. Bear, black cub feeding from bottle.
630. Bear, grizzly.
642. Bear, grizzly.
627. Bear, grizzly, hide.
632. Beaver, American.
602. Deer, black-tailed, State Game Farm.
613. Deer, black-tailed, resting.
616. Deer, black-tailed, Santa Cruz County.
617. Deer, black-tailed, Santa Cruz County.
622. Deer, black-tailed, State Game Farm.
610. Deer, coast mule, San Diego Park.
611. Deer, coast mule, San Diego Park.
612. Deer, coast mule, San Diego Park.
615. Deer, mule, in Sequoia National Park.
604. Deer, mule-tail, near Mt. Whitney.
605. Deer, mule, from Nevada (Alum Rock, San Jose).
606. Deer, mule, head of.
603. Deer, Michigan white-tailed (Los Angeles Park).
614. Deer, San Benito County.
623. Deer, four at Salt Lick, Hayfork River, Trinity County.
628. Doe with fawns.
621. Elk, Roosevelt in California.
631. Fisher.
608. Jerky, Lake County.
609. Jerky, Lake County.
635. Lion, mountain.
636. Lion, mountain and kitten.
637. Lion, mountain, and Jay Bruce.
638. Lion, mountain, and Jay Bruce and his dog Eli.
640. Sheep, desert mountain group.

FISH.

1253. Barracuda, boatload of, at San Pedro.
1208. Bass, black sea.
1229. Bass, black, seining from overflow, Yolo Basin.
1206. Bass, striped.
1260. Clams, Pismo, at Watsonville.
1236. Cutthroat, or Tahoe trout.
1263. Grunion, or little smelt.
1203. Salmon, quinnat.
1246. Salmon, five species on Pacific Coast.
1205. Salmon and trout showing diagnostic characters.
1204. Salmon fishermen.
1230. Salmon in Fish Creek, Ketchikan, Alaska.
1247. Salmon spawning, Klamath River.
1249. Salmon, marked.
1250. Salmon, scale of, showing annuli.
1251. Salmon, scale in fifth year.
1252. Salmon scale showing annuli.
1212. Salmon hatchery at Baird.
1255. Sardines, boatloads of, at San Pedro.
1256. Sardines, age classes.
1259. "Scuds," favorite food of trout in mountain lakes.
1207. Shad.
1263. Smelt, little or Grunion.
1258. Sunfish killed in irrigation ditch due to lack of screening.
1237. Trout, eastern brook.
1202. Trout, German brown.
1241. Trout, Loch Leven.
1242. Trout, Loch Leven, catch of.
1201. Trout, rainbow.
1225. Trout, rainbow, catch of.
1257. Trout, 3-lb. rainbow leaping waterfall near Downeyville.
1235. Trout, steelhead.
1243. Trout, steelhead, killed by pollution, Pajaro River.
1244. Trout, steelhead, killed by pollution, Pajaro River.
1236. Trout, Tahoe or cutthroat.
1205. Trout and salmon, showing diagnostic characters.
1224. Trout distribution, 1915 (cut showing relative figures).
1214. Trout eggs for shipping.
1217. Trout planting, American River.
1213. Trout, spawning, Sisson Hatchery.
1254. Tuna, unloading at cannery.

CONSERVATION.

1000. Are you the man on the fence?
1001. California surrounded by non-sale states.
1002. Non-sale states (Aug. 19, 1914).
1003. How to vote.
1004. Market hunters at Los Banos.
1005. Sportsman's bag.
1006. Market hunters and bag.
1007. Feeding valley quail at Bishop, Cal.
1008. Winter feeding of quail, Inyo Co.
1009. Winter feeding of quail.
1010. Valley quail being fed, Bishop, Cal.
1011. Deer (National Forest, Colorado).
1013. Robins killed by Italians.
1014. Italian bird net.
1015. Sheep on way to winter range.
1016. Area denuded through grazing.
1017. Eroded slope.
1018. Erosion in abandoned fields.
1019. Fire in National Forest, Plumas County.
1020. Burned stump land.
1021. Forest fire in Wyoming.
1022. Reproduction after fire.
1023. Band-tailed pigeon hunters.
1024. Boy making a bird box.
1025. Bird boxes made from odds and ends.
1026. Artistic bird boxes.
1027. Bird boxes for woodpeckers.
1028. Nesting boxes in place.
1029. Martin houses.
1030. Devices to protect birds from cats.
1031. Passenger pigeon, male.

NATURE STUDY.

1501. Blind school, Royal Hunting Lodge, Deer Park, Copenhagen.
1502. A botanizing trip in Denmark.
1504. An outdoor school in Leubeck.
1505. Outdoor class studying history, Hildesheim, Germany.
1506. Fifth-graders being taught conservation, South Side Park, Sacramento.
1507. Nature study in the field, fifth grade, Sacramento.
1508. San Francisco Bay and Ferry Building.
1509. Nature study class in Yosemite Valley.
1510. Field excursion in Yosemite.
1511. Children's nature study class, Yosemite.

CALIFORNIA FISH AND GAME.

A publication devoted to the conservation of wild life and published quarterly by the California State Fish and Game Commission.

Sent free to citizens of the State of California. Offered in exchange for ornithological, mammalogical and similar periodicals.

The articles published in CALIFORNIA FISH AND GAME are not copyrighted and may be reproduced in other periodicals, provided due credit is given the California Fish and Game Commission. Editors of newspapers and periodicals are invited to make use of pertinent material.

All material for publication should be sent to **H. C. Bryant, Postal Telegraph Building, San Francisco.**

March 18, 1927.

"Legislation is only a handy man of education and unless accompanied by favorable public sentiment will fail of its object."—Missouri Game and Fish News.

TIME ELEMENT IMPORTANT IN CONSERVATION.

It takes nature centuries to build for us the natural resources which we enjoy. We continually cut down trees 300 and 400 years old, thinking that we can readily replace the timber in a few years; we continually harvest a large crop from our wild life resources, expecting that replacement will take place within a short length of time; we take boatloads of fish from the ocean expecting replacement within a few years. Only occasionally does man stop to consider what an intricate thing replacement really is, and the time element necessary. Yet, this very thing is the fundamental truth upon which all conservation measures should be based.

A recent article in American Forests and Forest Life (Vol. 32, No. 391), calls attention to the destruction of mountain meadows, due to overgrazing and the difficulty in rehabilitating a meadow so destroyed. The article is particularly impressive, because it is written by a cattleman, who is dealing with first-hand information and not with hearsay. He points out that an eight-year attempt to reestablish overgrazed meadows has resulted only in a crop of weeds.

It was more than five years ago that a serious epidemic reduced the gray squirrel population to a minimum. At the present time but slight increase in numbers is to be noted in localities where the disease was prevalent. Consequently, in spite of the fact that the squirrel is a prolific breeder and that it has had total protection for a period of five years, replacement is not in sight.

The sea otter was given total protection in 1913, but the species is still a candidate for extinction. The sturgeon shows little sign of a return to abundance after a number of years of total protection.

When the length of time it takes to replace natural resources is considered, the need for more careful use and more careful thought for the future is evident. We can not long continue to harvest recklessly a crop that takes centuries to grow, nor dare we contemplate substituting weeds for grass, rats for rabbits, or English sparrows for goldfinches.

PREDICTIONS OF GAME ABUNDANCE NEEDED.

Government experts are able to predict the exact height of each tide expected during the month or year; anyone interested in the actual height of the water is able to get accurate data. The weather bureau makes useful predictions as to weather conditions; anyone who wishes to know what the prospects are for sunshiny or cloudy weather can get reliable information. Certain men employed by the United States Department of Agriculture annually collect data to enable the department to forecast unusually large crops of any commodity or any shortage. Science has helped us to secure data sufficiently accurate to make useful predictions. If we turn our attention to fish and game, however, we discover that little is done to collect information necessary for predictions as to abundance or scarcity. Everyone knows that wild things of every kind have cycles. Certain years they appear in abundance and other years in less abundance. Many factors control these fluctuations. If conservation organizations should follow the lead of other departments in attempting to foretell the status of various species from year to year wiser use of natural resources would be obtained. Even of more import than the actual prediction is the knowledge of factors concerned in increase or decrease.

Other states have taken one step in the direction of securing necessary data by taking a game census. The kill must bear a direct relation to the annual increase. California plans a similar census which will be an important advance. Then must come studies of life history and normal rate of increase making comparison possible.

STRIPED BASS ONCE MORE.

As was indicated in the leading editorial of the Striped Bass Number, the plan was to follow the more technical article which appeared in that number by one giving the viewpoint of an actual fisherman. By good fortune an inveterate striped bass angler, who fishes regularly at the mouth of the Salinas River, was secured to write exactly what he thought about striped bass. Even though the author may not be able to prove every statement made, he at least has drawn some conclusions from his own observations and has frankly given them. Some of the points brought out by Mr. Hubback give food for thought and remind us that much is yet to be learned of this erratic game fish.

DEPUTIES RECEIVE NEW MANUAL.

A manual for deputies of the Fish and Game Commission was issued May 1, 1914. This has long been out of print and the Commission has until now been unable to put into the hands of its employees, a dependable reference manual relative to law enforcement. A revised edition of this manual was issued on July 1, 1926. Information useful to a deputy fish and game commissioner is grouped under the headings: qualifications, relations with other officers, arrests, search and seizure, warrants, making a case. Through the courtesy of the National Automobile Club, each deputy was furnished with a National Automobile Service Guide containing maps and full auto information. The two manuals bound in a loose leaf leather folder makes a handy reference work for each field man.

SOMETHING MORE THAN PROTECTION.

The thought lying behind the well-known statement of the martyred Miss Cavel, "something more than patriotism," leads us to use a similar phrase relative to methods of fish and game conservation. "Something more than protection" is needed to assure us a permanent supply of wild life Visit any reclaimed marsh where you formerly hunted and no matter how much protection has been given the waterfowl in recent years, you will find no birds to shoot. The increasing protection that has been given ducks and geese does not assure large flocks of these birds to areas like Lower Klamath Lake at the present time. The something more than legal protection, which is absolutely needed, is to be found behind the words, "food supply, and cover." One wonders sometimes if we are not over-emphasizing the matter of legal protection and forgetting almost entirely some of the fundamental biological needs of a species.

Fortunately, one who follows editorials of conservation will discover that within the last two years, less has been said about new laws and more said about furnishing game with suitable food and cover. The sooner we recognize the biological needs of wild life, the sooner we may expect really to attain conservation.

PIKE AND TROUT.

The Sacramento pike, or squaw fish, is a member of the minnow family and grows to be one of the largest of minnows. It is native to practically all of the lowland streams of the state and most experienced fishermen have occasionally caught the fish with hook and line. Among many anglers the fish does not bear a savory reputation, for it is believed to be predatory and to feed upon trout. Many a man will explain that he has actually seen pike destroy trout, and he backs up his observations by pointing out that where pike abound in a stream, trout are seldom found. In southern Monterey County a complaint is continually made that in dry years, when the Arroyo Seco and San Antonio have low water, entire pools in the lower reaches are filled with pike, where formerly they were filled with trout. Certainly the relations between this fish and trout should be investigated before a wholesale method is employed for the destruction of pike. Should any reader of this magazine have worthwhile information relative to the relations existing between these two fish, the Fish and Game Commission would be glad to receive it.

AYU EGGS IMPORTED.

A shipment of ayu eggs arrived from Japan on November 1st, in charge of Dr. Ishikawa of Tokio. Unfortunately all were dead on arrival. Half of the shipment was sent to the Mount Shasta Hatchery, Siskiyou County, and the other half to the Brookdale Hatchery in hopes that a few might be saved. However, like two or three former shipments, they arrived covered with fungus and the embryos were all destroyed before they reached San Francisco. The eggs were inspected on arrival as well as at the Brookdale Hatchery by Mr. G. A. Coleman, biologist, and at the Mount Shasta Hatchery by Superintendent G. H. Lamb-

son. and all the eggs were found to be dead.

Mr. Coleman's report included the following statements: "The eggs were found to be in a very poor condition, the three top trays in each case being covered with a white fungus. The middle three trays were not so bad with fungus and the four in the bottom which were entirely immersed in water were apparently free from fungus. The eggs in the water had a natural color but those in the upper trays were nearly all white. Examination with the microscope showed that the eggs in the lower trays had developed embryos in about one-third of them, the rest being apparently undeveloped. A very few in the middle trays showed signs of embryos but none in the three upper trays. The temperature in the room in which they were kept on board ship (a refrigerator room) was forty-five degrees F. The temperature between the trays in the boxes was forty degrees F. when taken from the ship and the same next morning after shipment to the Brookdale Hatchery. Dr. Ishikawa said he thought they were kept too cold.

"A place was prepared in an outside pond at the Brookdale Hatchery where they could have plenty of fresh water and twenty trays placed therein and covered with the cloth covers used on hatchery trays. Ten trays were placed in one of the hatchery troughs inside. Temperature of the water in pond under eggs at 1 p.m., November 2, was 60 degrees F. Temperature of water in hatchery trough at 1 p.m., November 2, was 52 degrees F. Examination on November 19 showed no sign of life in any of them—most had turned white.

"Examination of the mats in the trays showed them to be full of fungi of several varieties—protozoa (Paramecium, etc.), and of bacteria. RESULT: a complete failure. There were six cases in the shipment, three being shipped to Mount Shasta and three to the Brookdale Hatchery."

This is the third attempt made to introduce the ayu into California. Until greater precaution is used in destroying the spores of fungus and looking after the packing of the eggs, there is little hope for success.—W. H. Shebley.

CHUMMING IS LEGAL BUT—

It has been reported on good authority that one dealer situated on the bank of Big Bear Lake in southern California received last season a shipment of fifty cases of corn and peas. Let it be understood that this shipment was not designed for human consumption, but for fish consumption, for more and more it has become the custom at this lake to chum trout. This is accomplished by dumping several cans of corn and peas in a particular place to entice the fish to that portion of the lake and then catch them on hook and line. Probably this is on a par with baiting ducks to a pond. Nevertheless, when unfair advantage is taken of wild life, greater depletion is the result. If we play fair, good sport will continue for a long period.

CALIFORNIA SALMON MAY FEED OFF BRITISH COLUMBIA COAST.

Several years ago some cooperative tagging experiments with salmon were planned by the International Pacific Salmon Investigation Federation. This organization has coordinated the salmon work along the Pacific coast and acts as a clearing house for advice and information. At a meeting held in Seattle on December 2, reports were given which tend to show that salmon of several species from along the entire Pacific coast may find feeding grounds off the British Columbia coast. Extensive tagging experiments have been carried on by British Columbia with a remarkably fine percentage of returns. Of most interest, is the news that one king salmon and one silver salmon tagged in California were secured in the waters off British Columbia. Nearly 50 per cent of the tagged fish taken have been from the Columbia river or southward.

Resolutions passed at a recent meeting of the committee are:

Whereas, a constant and nation-wide propaganda has been maintained in newspapers, engineering and technical magazines, etc., conveying the impression, based on the partial success of an experimental fishway at the Baker River dam near Concrete, Washington, that a complete solution has been reached of the problem of safeguarding salmon runs jeopardized by the construction of dams; and

Whereas, and in the opinion of this federation, no solution of this problem has yet been reached that can properly be considered as of general application; and

Whereas, in the opinion of the federation, the problem connected with each dam is individual and distinct; and

Whereas, much of the work at the Baker River dam so far has been experimental, and the results there are not yet conclusive; therefore be it

Resolved, that the International Pacific Salmon Investigation Federation, at this meeting of December 2, 1926, strongly disapproves the propaganda above men-

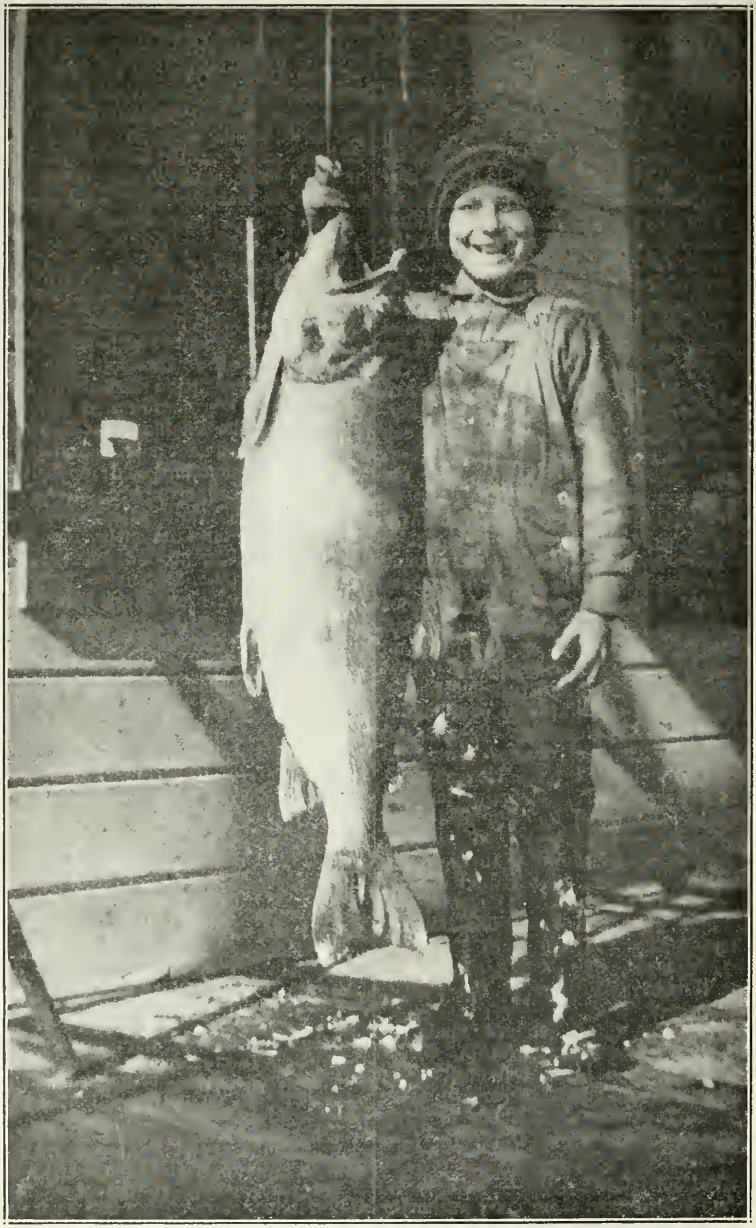


FIG. 8. A 32½-pound mackinaw trout taken at Homewood on Lake Tahoe in the spring of 1924. The mackinaw, which grows largest of all American trouts, is increasing in numbers in Lake Tahoe.

tioned, as being unwarranted and misleading.

THE WARDEN'S VIEWPOINT.

In the June issue of the *Service Bulletin* the question was asked, "What are the essential qualifications of a good fish and game warden?"

In examining the answers of the different wardens it appears that they have many ideas in common.

Of those who replied, the greatest number emphasized honesty and ability to handle the public; a large number insisted on a thorough knowledge of the game laws and pointed out the need of courtesy and the ability to command the respect and cooperation of citizens and officials. Fearlessness, fairness and education of the public were points stressed by many others.

Following are three of the replies, quoted in full. They are typical of the many that were received and give some idea of the high standard of ideals prevalent among our fine corps of game wardens:

"The position of a fish and game warden is not merely a job as many would think, but I would say 'a profession of no small degree.' First of all he is possessed or gifted with a natural love for nature and its living beings. He is physically fit to endure the hardships which may come before him. He is fearless, efficient, loyal and honest. His heart and soul are in his work. He has a wilful desire to perform his duties at all hours of the day and night. He is always alert and able to determine the direction of a shot or sound. He is courteous except when the opposite is necessary. He understands that he is the arresting officer and not the judge, therefore he does not impose the penalties. He respects and gains the respect of the public. He has made a study of human nature and knows how and when to approach offenders. He is naturally curious in his line of work, and when in pursuit of violators he shows good judgment, detection and determination.

He destroys predatory birds and animals whenever the opportunity presents itself. He always bears in mind that 'silence' is very important and generally necessary when he pursues violators in a district where he is known. He has a general knowledge of law procedure, and is thoroughly familiar with the fish and game laws, and how they should be enforced. He is continually seeking the cooperation of all those who may be able to assist him. He dismisses any feeling of friendship or favoritism when he performs his duty. He is a firm believer of conservation through education, and accepts opportunities to talk conservation both publicly and privately. He knows the great value of publicity, and therefore he writes articles for the newspapers. He is continually trying to improve his district by figuring out ways and means whereby he can cut down the number of violations, bearing in mind that the prevention of the crime is always to be preferred.

He knows that a lawful district with few arrests is better than a lawless district with many arrests, and he works accordingly.

This is my idea of what the essential qualifications of a good fish and game warden should be."

"A game warden should always bear in mind that he is serving the public and that cooperation is the most essential factor of his work. This can be secured by a spirit of helpfulness rather than an officious attitude. Most people will listen to reason if approached in the right way. It is expected that a game warden will be firm in his determination to enforce the fish and game laws, but his firmness will be made more effective if tempered by a due consideration of the rights and privileges of the other fellow."

"A game warden should be fearless in the discharge of his duties; should be honest and fair in his dealings with everyone—rich and poor alike, giving favors to no one.

He should be diplomatic, as much can often be accomplished by a little diplomacy on his part.

He should ever be on the alert for violators, and honorable in his dealings with all.

A good game warden makes friends for the commission and for his superiors as well as gaining respect for the fish and game laws by his courteous manner whether in the making of arrests or along educational lines, by explaining the various fish and game laws.

At all times, he should aim to win the respect and friendship of the various judges, district attorneys and even of the violators."

WEEDS OR WILDFOWL.

All who have investigated conditions on Lower Klamath Lake in recent years have met the argument of local residents, that the dry lake bottom is furnishing forage for sheep. Inquiry discloses the fact that the grazing consists of a crop of weeds which appear annually on only one part of the lakebed. Much of the lakebed is too alkali to grow even weeds. Since a great deal is made of this in support of the drainage of the lake, it is only reasonable that those interested in bird life should make a comparison as to the actual values, nor need this comparison be devoted to actual figures, for that is the easiest method of comparison.

The following argument is still more to the point. Sheep can be reared most satisfactorily on cultivated ground. Alfalfa fields and stubble furnish the best of food. On the other hand, wildfowl can not be reared satisfactorily on similar lands. Large bodies of water are necessary for breeding grounds and for safety. As a consequence, good agricultural lands are the logical location for sheep breeders, whereas lakes and marshes should be allotted for breeding of wildfowl. The sheep industry holds its own, whereas our resources in wildfowl have been greatly on the decline. Unless more careful allotment of lands in relation to wildfowl is made, we shall lose entirely the benefits which accrue from this resource and replace it with some standardized live stock industry.

In the case of lower Klamath Lake, if it is a matter of weeds or wildfowl, can there be any doubt that more people are definitely interested in the saving of wildfowl than in the production of weeds for sheep?

GAME WARDEN'S JOB A DANGEROUS ONE.

The more dangerous employment is, the more carefully it should be protected by insurance. Salaries have been so meager in the case of California wardens that few have been able to satisfactorily protect themselves with insurance. With these facts in mind, the employees of the Commission, at their last annual meeting, appointed a committee to investigate a salary allotment plan of group insurance. After a report of the committee, a plan was worked out and many employees have accepted the opportunity of securing life insurance at low rates and with no need for a medical examination. Arrangements were made with the company handling the largest volume of group insurance to furnish employees a choice of any kind of life insurance, the premium on which is to be deducted from the monthly salary. It is expected that before the end of the year a good proportion of the employees will have taken advantage of the plan selected by the committee.

LOCAL GAME REFUGES.

Probably few realize how often private individuals turn their ranches into game refuges. A recent letter from a man who owns a 700-acre ranch in southern California tells of his interest in the mourning dove and his desire to make his particular ranch a refuge. He states that the average hunter takes the attitude: "If I don't get them someone else will." His retort is that if they will leave them alone on his ranch, doves will rapidly increase and furnish better sport on surrounding areas. Provided there are not too many such local bird refuges, the end result will be very much worthwhile. Some states are advocating a refuge not only for every county but a small one for every township and with several of the larger ranches in a county set aside as refuges where no hunting is allowed and safe breeding stock can readily be maintained.

TWO SIDES OF A QUESTION.

After one attends a meeting of a fish and game protective association and hears numerous arguments on a question, one at first thought is disturbed with these wordy tilts. But let one visit another meeting and see resolutions railroaded through, as they are occasionally, with but one side of the question discussed and he is ready to appreciate the value in discussion and the desirability of always having both sides of a question presented. When you hear some sportsman refuse to hear the opposition, you may be sure that some of his measures are half-baked and dangerous. All too frequently, organizations rush into undertakings that later they would gladly abandon. No finer check on worthwhile undertakings can be found than that to be secured by free discussion of two sides of the question.

The value of free discussion of fish and game problems was evident at the Second Annual Sportsmen's Convention held at the Whitcomb Hotel, San Francisco, December 9 and 10. The most important deliberations concerned the recommendations of the Fish and Game Study Committee appointed by the California Development Association. With but a few exceptions the recommendations were accepted by the meeting. A splendid group of sportsmen were present and the net result will be a united stand on the more important legislation planned, and a better understanding of game conditions and conservation needs in all parts of the state represented by delegates.

WHALING OPERATIONS START IN SOUTHERN CALIFORNIA WATERS.

The success of whaling operations along the north coast has led to a new venture in southern California. The California Sea Products Corporation, a firm financed by San Francisco capital,

now plans to establish a whaling station with its base at South Bay, San Clemente Island. The intention of this firm is to fish the waters for a radius from fifty to one hundred miles from this center for the blue whale, the oil of which is valuable. The "Lansing" is now being equipped and fitted out in the latest approved style for the utilization of the whales. A fleet of four smaller vessels, known as "killer" ships, will secure the animals. The firm began its operations about November 1st.

BETTER PROTECTION FOR STEELHEAD NEEDED.

One of the conservation problems that through the years continues to confront California has to do with the steelhead trout in coastal streams. Not only does the season remain open during the winter time so that larger spawning fish are continually caught, but the season again opens in May and continues open during the summer season. During the summer, few large trout are in the stream and therefore catches are largely limited to three and four-inch young fish, which should be given an opportunity to develop before being caught. Perhaps there are several solutions, but they remain untried with the exception of the attempts to introduce some resident species. The cutthroat trout is being tried out in the streams of Humboldt County. This may eventually produce a larger sized fish and reduce the toll taken of young steelhead. The plan of closing the season during the summer time hardly seems feasible, because of the demand of vacationists for an opportunity to fish coastal streams.

SOME RESOLUTIONS OF THE WESTERN FISH AND GAME COMMISSIONERS' ASSOCIATION.

Among the more interesting resolutions passed by the Western Game Commissioners', meeting held is Boise, Idaho, last August, were the following:

Resolved, That we hereby approve the efforts of our representative to secure adequate and proper federal legislation for the protection of migratory wild fowl throughout the United States and the proper enforcement of existing laws for this purpose and we endorse the Public Shooting Grounds and Marsh Land Conservation Bill now pending before congress, and recommend its early passage. Be it further

Resolved, That Mr. D. H. Madsen, Game Commissioner of Utah, be empowered to represent the Western Association of State Game Commissioners at the coming meeting of the International Association of State Fish, Game and Conservation Commissioners to be held at Mobile, Alabama, for the purpose of assisting in the passage of the Public Shooting Grounds and Marsh Land Conservation Bill.

Resolved, That we again urge our several state legislatures to enact a law which will prohibit the sportsmen of the several states having in their possession to use as bait or for any other purpose, any salmon eggs or imitations of prepared form thereof in any of the public waters of the several states or for any person, company or corporation to sell or offer for sale, any salmon eggs or imitation or prepared form thereof.

We endorse the policy of cooperation evidenced by the Department of Agriculture through its Forest Service in cooperation with the state departments for the protection and preservation of wild life in the National Forests and pledge our several departments to work in harmony with forest officials to this end, but we view with alarm the pending legislation, especially Senate Bill number 1147, which seems to propose additional Federal jurisdiction over the wild life in the National Forests, which in our opinion, are already adequately protected by state and federal legislation. We maintain that the protection of resident game within the several states is a responsibility of the states and that any attempt on the part of the federal government to assume this responsibility is not constructive and might seriously interfere with the splendid spirit of cooperation now existing between the state and federal officials charged with the protection of wild life.

HOW MANY FISH WILL A STREAM SUPPORT.

More and more fish experts are turning their attention to the main biologic factors concerned in the life of various species of fish. A recent report from Canada (Losses in Trout Fry after Distribution, *Science*, 64, pp. 228–229) gives the results of the work of an expert who decided to determine the comparative numbers of different kinds of fish within a known area. The seining of a quarter of a mile of Forbes Brook, Prince Edward Island, Canada, in October, 1925, produced 319 trout, 82 fundules, 33 salmon parr, 16,152 stickleback, making a total of 16,586 fish in this short stretch of stream. "At the same time

only about 1066 trout fry were found alive out of 4020 distributed in this same area in July, 1925." The article calls attention to the fact that this area of stream produces food enough to feed a certain number of fish, just as fifty acres of pasture land feeds only a limited number of cattle. In addition to the tangible factors concerned of food supply and enemies, there are many more intangible ones, such as temperature, oxygen and carbon dioxide content, salinity and intensity of light, pressure and pollution.

Whenever someone turns his attention to carefully planned experiments on the improvement of conditions in a stream in order to furnish biologic necessities and increase production, worthwhile advances in improvement of angling conditions can be expected. Several years ago investigations along this line were begun by the California Fish and Game Commission. A trained biologist was employed and already new knowledge of the food of trout has resulted in improvement in many mountain lakes due to the furnishing of an additional food supply. Complete biological surveys of various lakes and streams have been made and there is continual effort put forth to fit the fish to each stream or lake and artificially improve conditions for the fish wherever possible.

FISH LADDER ON SACRAMENTO RIVER BEING INSTALLED.

Sacramento River salmon will run freely to their spawning beds this year in greater numbers than ever before, due to the construction of a new fishway around the eastern end of the diversion dam maintained by the Anderson-Cottonwood Irrigation District near Redding. Announcement coming jointly from the commission and the irrigation district telling of the adjustment of difference of long standing over this matter will be received with interest by Californians who foresee as a result increased runs of salmon in California streams.

Work on the new fishway, which is to be of the best, modern construction, has already begun. It will be finished in time for the early spring run of salmon. The rest pools forming the fishway are twelve by twenty feet and rise, stairway-like from the bed of the river below the dam to the flood waters impounded above it. Steel and concrete are being used, thus forming a structure which will withstand the rush of waters for many years, and provide access to the spawning beds in upper reaches of the great river for California's finest sporting and food fish.

The agreement between the commission and the district was reached after numerous conferences between officials of both organizations. The installation is being made in connection with the regular annual repair program of the district.

In the conferences leading up to the solution of the problem the commission was represented by Jack Spencer, director of the Bureau of Screens and Ladders. The entire board of directors of the district represented its clientele.

TREE SQUIRRELS IN THE LAGUNA MOUNTAINS TO RECEIVE WINTER FOOD SUPPLY.

Acting upon reports from the supervisor of the Cleveland National Forest that the acorn crop was an entire failure in the Laguna Mountains and that squirrels would be affected, the San Diego County Fish and Game Protection Association is cooperating with other societies in furnishing an artificial supply of food. A fund is being raised to buy corn. This is to be transported in a forest service truck to the Laguna Mountains and distributed by forest rangers.

The abundance of any species is perhaps more dependent upon food supply than upon any other factor concerned. As a consequence, attention paid to furnishing an artificial supply of food during periods of scarcity is sure to bring about worthwhile results.

BIRD AND ARBOR DAY.

March 7th of each year (the anniversary of the birth of Luther Burbank) has been set aside in California as Bird and Arbor Day.

It is hoped that all schools will observe this day, not as a holiday, but by including in the school work suitable exercises and instruction in the economic value of birds and trees, and the promotion of the spirit of protection toward them.

Suitable material for a program may be found in a Bird and Arbor Day Bulletin which has been published by the Superintendent of Public Instruction. The bulletin contains several articles pertaining to fish and game conservation and is illustrated with cuts loaned by the Fish and Game Commission.

A NEW BOOK ON PHEASANTS.

Everyone interested in pheasants knows that the most dependable and most pretentious reference work is by William Beebe, "Monograph on Pheasants." This monumental work, issued by the New York Zoological Society and its interested patron, Colonel Anthony R. Kuser, is not available to the average pheasant breeder because of the high cost of these splendid

volumes. Only a few of the larger libraries have been able to purchase sets. Pleasing information now comes that the New York Zoological Society plans to publish a two-volume abridged edition of the work in quarto size, with eighteen colored plates and numerous photogravures. Only portions of text which are of general interest will be retained and the more technical parts which would appeal only to the trained scientist will be omitted. All interested in propagation of pheasants will look forward to the publication of this work.

MIGRATION OF BONITOS IN THE NORTH PACIFIC.

David Starr Jordan in a recent article (*Science*, 64, p. 499) calls attention to a notable migration of bonito encountered by A. C. Lovekin, of Riverside, California, in July and August, 1893. During a period of light winds while some hundreds of miles almost due north of Hawaii and about in the latitude of San Francisco, enormous schools of bonito and tuna were seen. "There seemed to be no limit to their number and as far as we could see on all sides the ocean was packed with fish," is the statement made by Mr. Lovekin. For ten or more days they surrounded the ship. A number were easily caught by using a bit of white rag attached to a common fishhook. Some of the larger tuna, weighing up to eighty pounds, were harpooned.

AUDUBON SOCIETY REPORTS ON EDUCATIONAL WORK.

At the annual meeting of the National Association of Audubon Societies, last fall, reports were given summarizing the educational work of the organization. During the preceding year, the staff gave 1500 lectures, the attendance totaling 250,000. The Junior Audubon work has grown until the groups now number 8094 and the membership 327,776. This is undoubtedly the largest and the most constructive work along conservation lines thus far undertaken in the United States. The National Association now has united 864 clubs, and has a total membership of 28,471. Considerable sums of money have been invested in bird sanctuaries in order to safeguard disappearing species. Audubon sanctuaries are now to be found in nine different states.

DEER HUNTERS NUMEROUS IN COAST RANGE.

On the opening day of the deer season last fall, it was estimated that between twelve hundred and fifteen hundred hunters traveled the Mine Road in the Livermore Mountains. Probably, the herd of hunters exceeded the herd of deer to be found, for the estimated number of deer taken on that day was only twelve.

BIOLOGICAL SURVEY CHIEF SURVEYS THE DUCK SITUATION.

Dr. E. W. Nelson, who, as chief of the Biological Survey, is charged with the administration of the Migratory Bird Treaty existing between Great Britain and the United States, was recently in California completing a tour of inspection of the districts where the mortality of ducks has been greatest. At the meeting in San Francisco of the Associated Sportsmen's Clubs, Dr. Nelson pointed out that in excess of 10,000,000 ducks had died in the west during the past few years due to poisoning contracted in the restricted water areas at key points in the lines of migration.

The worst conditions to be found in the entire country are west of the Rocky Mountains, and, of these, the main points are the Bear River marshes in northern Utah, Malheur Lake in eastern Oregon and the Tule Lake and Lower Klamath Lake areas in northern California. These areas comprise the few in which birds can concentrate in large numbers, but of late years the amount of water taken from the feeder streams for irrigation, reclamation activities, and the natural drought have rendered them sumps in which alkali and kindred poisons have become so prevalent as to kill the birds in colossal numbers.

The duck supply of the west is largely dependent upon these key areas and the solution of the duck problem is to be sought in the restoration of these essential marsh lands. It is essentially a western problem, for the ducks of the west are distinct from those of the balance of the United States. Elsewhere, the birds are holding their own against an ever-increasing number of hunters.

The above three areas supply birds to eleven western states, hence the problem is in a sense a federal one and cannot be solved by a single state alone. The solution lies in a sufficient congressional appropriation to maintain an adequate water supply in these areas.

The first undertaking should be the construction of a dam which would flood a marsh of more than 150 square miles in the Bear River Basin. This would assure a supply of ducks to California and ten other western states.

Next in line of importance is Malheur Lake in eastern Oregon, which would en-

tail the construction of a dam and a series of artesian wells, and following this, some method would be worked out to regain as a breeding and feeding ground more than 10,000 acres in the bed of Lower Klamath Lake. In connection with the latter project, Dr. Nelson stated that he had been in conference with officials of the district during his visit to southern Oregon and that he anticipated no opposition to reflooding an area which would approximate some 10,000 acres of the lake bed, so far as it would not jeopardize interests of the land owners. This area was designated by President Roosevelt in 1909 as a Migratory Bird Refuge, but in 1917, reclamation development was instigated which drained the entire lake bed. The reflooding, however, would entail the construction of an expensive dyke to protect the lands now in private ownership.

SAFETY SCREEN TO BE INSTALLED AT LAKE ALMANOR.

An agreement has been reached under which the much-discussed water diversion outlet to Lake Almanor will be screened to prevent the escape of fish from that body of water into the tunnel leading to one of the hydro-electric units of the great Western Power Company. This agreement was reached recently at a conference held at offices of the California Fish and Game Commission, in which representatives of the Associated Sportsmen's Clubs of California and officials of the power company were present. It is the belief of the sportsmen, who have labored long in an effort to secure this safeguard for the fish life of Lake Almanor, that the new plan will give satisfactory results and that many fish will be thus saved to spawn and provide splendid bags for those who visit that region.

Lake Almanor is located in Plumas County, about five miles south and west of Westwood, and about sixty-five miles northeast of Chico. It is a favorite fishing ground for many sportsmen who come from all over the state to cast their lures for rainbow and other fish peculiar to that region.

The outlet which will be screened by the power company is known as the Prattville Outlet. The waters passing from the lake at this point pass through a tunnel from three to four miles in length, into Buck Reservoir and finally into the turbines at the Great Western's Caribou Plant. The dam at the lake is being raised forty-five feet, thus increasing the reservoir to three times its present storage capacity and, according to officials of the company, remedying the muddy condition of the river.

SPOT WHALES BY AIRPLANE.

The whalers of the North Pacific, operating from Vancouver, B. C., are making preparations for a new venture in that industry—the use of sea-planes. Officials are confident that the use of a plane will greatly increase their catch. Looking down from an altitude of 1000 feet, a range of 25 to 50 miles can be obtained, and an airman will be able to pick out the mammals and communicate his find to the fleet by means of signals. This will enable the boats to approach their prey direct and not have to spend time searching for them.—*Catalina Islander*, Sept. 22, 1926.

CATS EAT BIRDS.

Recognizing the harm that cats do to our insectivorous and song birds, the Associated Sportsmen's Clubs of California have recently issued a small leaflet entitled "Cats Eat Birds," a replica of which is reproduced here.

Perhaps few people realize the role played by cats as bird destroyers. The cat, as a domesticated animal, seems an innocent and inoffensive creature, but it is not primarily with the well fed house cat that we are concerned. There is a large number of vagrant cats that have neither home nor owner. It is with this class that we have to deal. Left to themselves, it is, at times, hard for them to secure a meal and it is under such conditions that they revert to their primitive habits of preying on birds and small mammals.

The status of the domestic cat has been carefully investigated by E. H. Forbush, of the state board of agriculture of Massachusetts.* His conclusions are very ably set forth in the following quotation:

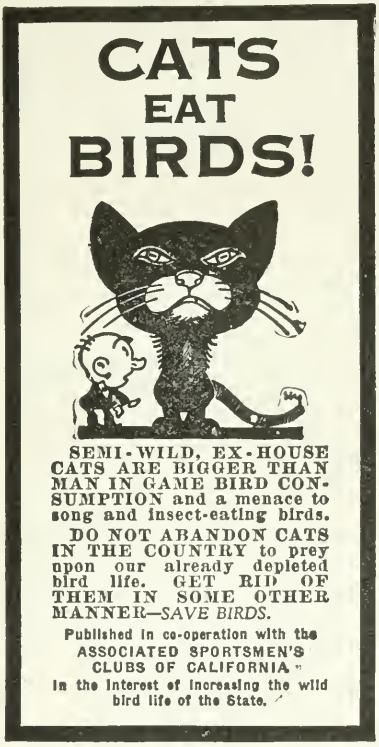
"The cat is far more widely kept and distributed than any other domestic animal, and is under less control and restraint than any other. It usually has a greater affection for places than for persons, and tends to return to its home when its owner moves away. Also, it readily abandons its owner, and, often abandoned by him, returns to the wild. Incalculable numbers of wild or stray

*Forbush, Edward Howe. The Domestic Cat. The Commonwealth of Massachusetts, State Board of Agriculture, Economic Biology, Bulletin No. 2, 112 pp., 1916.

house cats now roam the woods and fields of New England. These wild cats attract others from their homes.

"Many, remaining with the owners, are fed insufficiently or not at all, and having to rely on their own efforts for food, emulate those that have run wild. Many pet cats are allowed to roam the country at night. People keep too many cats, and as the population increases the number of cats increases accordingly.

"The cat, an introduced animal, is not needed here outside of buildings. It has disturbed the biological balance and has become a destructive force among native birds and mammals. It is a member of one of the most bloodthirsty and carnivorous families of the mammalia, and makes terrific inroads on weaker creatures. It is particularly destructive to certain insect-eating forms of life, such as birds, moles, shrews, toads, etc. Every year the cats of New England undoubtedly destroy millions of birds and other useful creatures, therefore indirectly aiding the increase of insects which destroy crops and trees. Such insects possibly cost the people of Massachusetts from seven and one-half million to nine million dollars annually. The cat protects them, thus increasing the cost of living to every citizen. The good that cats accomplish in the destruction of field mice, wood mice and insects is of little consequence beside the ravages that they inflict among insectivorous birds and other insect-eating and mouse-eating creatures.



"There are laws to protect insectivorous birds against gunners, snares and trappers. Birds of prey and wild predatory animals are proscribed by law, and bounties are offered on the heads of some. Many states offer bounties for native wild cats, but there is no law to check the ravages of the wild house cat, a far more numerous animal. A man may be fined $10 for killing a songbird, but he may keep any number of cats and may train them to kill many birds weekly. Hardly a hand is raised to stay the destruction of valuable wild life by hundreds of thousands of vagabond or wild house cats. Hunters and trappers have little incentive to kill them as the fur is of small value. Legislation is needed to check this evil.

"The claims of the cat to a place in our domestic life rest primarily on the fact that it is supposed to do for us, with little conscious effort on our part, the onerous, petty and disagreeable task of destroying small rodents which for centuries have elected to fasten themselves as parasites on civilization. In so much as the creature fails in this, in so far as it destroys other more useful or nobler forms of life, in such measure it becomes an evil and a pest. It will become an influence for good or ill according as we mould it, restrain it and limit its activities. It is our duty to check, with a firm hand, its undue increase in domestication, and to eliminate the vagrant or feral cat as we would a wolf."

THE GOATS OF GUADALUPE ISLAND.

Out in the Pacific on a nearly barren island, goats are learning to climb trees and swim in the ocean for food. Necessity is the teacher of this population of Guadalupe Island, a volcanic bit of dry land sticking up out of the sea 240 miles southwest of San Diego, according to Laurence M. Huey, curator of birds and mammals in the natural history museum at San Diego.

Guadalupe Island, which has become famous during recent years as the only known habitat of the elephant seal, formerly was used as a penal colony by the Mexican government. Today the only

inhabitants are a guard of Mexican soldiers to protect the elephant seals, which have become almost extinct, and myriads of goats.

These goats climb to the highest pinnacle, and thread their dangerous way up the face of the cliffs overhanging the sea in search of a blade of grass or a bit of herbage. During the dry season food is so scarce that the goats have resorted to eating the bark from the cypress trees which crown the island, and desiring the luscious looking foliage they learned to climb the trees. But by constant gnawing away of the bark, the trees are dying, and the goats have had to turn to the sea for their provender. They eat the bits of seaweed that are cast upon the beach and even venture into water for more pretentious forays.

By destroying the cypress forests the goats are destroying their only source of fresh water supply, and unless they learn to subsist upon the hitherto unpalatable salt water, they will die of both thirst and hunger.

The goats, which were first introduced in the penal colony days to supply food and milk for the colonists, have proved the nemesis of other forms of life on the island. Of the ten forms of bird life and mammals that are endemic to Guadalupe, they are responsible for the extinction of three. The towhee and wren were exterminated by the complete destruction of the underbrush, while the carcaras preyed upon the new-born kids and were destroyed by men who had been granted the concession of exploiting the goats for their hides and tallow.

Several carcasses of goats have been seen floating in the water beneath the precipitous cliffs, an evidence that the animals had fallen from the bluffs overhanging the sea. But, as a rule, they cling to the face of the precipices almost as tenaciously as a fly ascending a window-pane.—*Science*, Sept. 24, 1926.

REGULATION OF SHOOTING DEVICES DISCUSSED.

A conference of sportsmen, game officials and conservationists, called by Dr. E. W. Nelson, chief of the Bureau of Biological Survey of the United States Department of Agriculture, was held at the offices of the bureau in Washington during September to discuss the use of sink boxes or batteries, matblinds, and other devices employed in hunting migratory wild fowl in the waters of Maryland, North Carolina and Virginia.

It was desired to obtain information that might be of value in connection with the administration of the Migratory Bird Treaty Act and the preparation of any necessary regulations under it, in view of the belief of many sportsmen that there is a necessity for better regulation in the use of devices in duck shooting in some parts of the Atlantic Coast States. The situation was thoroughly discussed, and many valuable facts bearing on the matter were brought out looking toward a settled policy as to regulation.

OUR RANCH FOLKS.

Close their gates; be careful where you shoot; ask their permission before hunting or fishing in their fields; don't tear down their fences, or do any other wrong act. If you never go back, some brother sportsman's rights and your sport will be increased and your conscience will feel easier.—*Montana Fish and Game Commission Report, 1923-24.*

NEW BULLETIN ON FUR LAWS ISSUED.

The United States Department of Agriculture has recently issued a new bulletin on fur laws (Farmer's Bulletin No. 1515-F). It points out that all fur animals need proper protection, if their numbers are to be maintained and good fur is to continue to be produced. The value of the annual catch of fur-bearing animals twenty-five years ago was roughly estimated at $25,000,000. Today it is estimated at more than $60,000,000, and even this figure would doubtless have been exceeded if the supply had been maintained. Serious students of conservation feel that the fur resources are not being given deserved attention, particularly in the face of this monetary showing.

The principal fur bearers in the United States are the muskrat, skunk, raccoon, opossum, mink, marten, fox, otter, fisher, and beaver. The most valuable from the standpoint of financial returns from the annual catch are the four heading this list, although the pelts of some of the others have a higher individual value.

The new bulletin contains a complete summary of all the laws in the various states and Canadian provinces relating to fur animals effective for the present trapping season. Regulations affecting the interstate shipment of pelts are explained, and the legislation enacted during the year is reviewed, with all important changes noted. The information is published to encourage effective action on the part of trappers, fur tradesmen, legislative committees, conservation societies, and others concerned in maintaining the

stocks of fur animals, and thus the fur supply.

The bulletin may be obtained, while the supply lasts, by addressing the United States Department of Agriculture, Washington, D. C.

THE TULE GOOSE.

Until a short time previous to the description of the tule goose which appeared in 1917, it was not generally known that two kinds of white-fronted geese annually repair to the Sacramento Valley of California in winter. Additional notes on this larger and rarer tule goose have recently appeared in *The Condor* (Volume 28, pp. 241-243) under the authorship of James Moffitt. His observations were made at Joyce Island, in the Suisun Marshes of Solano County. Records of this bird from more southerly points are yet to be obtained.

Since some of the points brought out should be of interest to hunters, they are cited here.

1. The tule goose has a much darker shade of brown on the neck and head. Weights run six and seven pounds against four and five pounds for the white-fronted goose.

2. It frequents the heavily wooded banks of the larger sloughs and the ponds in the midst of heavy tule growth. They do not seem to leave this area for stubble fields as do the white-fronted geese.

3. In flight, the larger bird has slower, more measured wing beats. They fly closer to the ground, seldom attaining an elevation of more than 200 feet.

4. Flocks of tule geese are composed of fewer individuals than those of the white-fronted geese, six to eight birds of the former as against twelve of the latter are the rule.

5. The voice of the tule goose is noticeably harsher and coarser than that of the white-fronted goose.

HORNS AND ANTLERS.

Although it is customary for the average hunter to speak of the horns of a deer, yet proper usage would require the term "antlers." According to the Ranger Naturalists' Manual of Yellowstone National Park, reference to Webster's Dictionary shows that horns are "processes born on the heads of many hoofed mammals and used chiefly as weapons of offense or defense. . . . They consist in a horny sheath of epidermal substance supported by a bony core. Whereas "antlers" differ in being solid, generally branched, bony outgrowths shed and renewed annually.

In other words, horns are in a way comparable with finger nails or hair and hoofs—modifications of the skin. Whereas antlers are composed of bone and are modifications of the skeleton.

"The antlered animals, elk, deer and moose, shed their horns in the very early spring or late winter—in February or March usually, and immediately thereafter the new ones start to grow. During the time that the horns are growing they are soft and spongy and are covered with a thick layer of skin, and the whole structure is richly supplied with blood vessels and nerves. The blood is the building agent and the nerves keep the growing horns very tender so that the animal will not use them nor even touch them against anything hard if he can avoid it. Thus they are carefully protected against injury while they are still soft. The horns are fully grown in late August or September but the protecting skin does not usually start to dry up and peel off until the last part of the month of September. Then the animals rub them against trees and bushes, stripping off the dead skin and leaving the new, sharp antler fully grown, ready for the fighting season.

"All American horned animals have hoofs, but all hoofed animals do not have horns. We immediately think of the horse and the pig. All of the native hoofed mammals in Yellowstone National Park are ruminants, chewing the cud."

CHIEF OF PATROL ATTENDS EASTERN CONVENTION.

Mr. J. S. Hunter, chief of patrol, represented the California Fish and Game Commission at the meeting of the International Association of Game and Fish Conservation Commissioners and the American Fishery Society meetings held at Mobile, Alabama, September 20 to 24. He reported that many interesting papers were read and that the discussions were very much worth while.

The argument on the Federal Game Refuge and Public Shooting Ground Bill showed that most opposition comes from the middle west. The active opponents were representatives from Kansas, Oklahoma and Texas. Kansas objected to it because they wished to avoid government interference in game conservation. The representative from Texas called attention to the fact that a few years ago there were only four voiolations for which a man could be prosecuted in the federal courts, now, he stated, there are sixty-four. Notwithstanding these ob-

jections, the convention passed a resolution strongly endorsing the federal bill.

Before adjournment, the association adopted a resolution vigorously protesting against the unjust and unreasonable provisions of the National Tariff Act which requires the payment of a duty on game birds imported for stocking purposes by state game commissioners. The officers of the association were empowered and directed to use all proper means through the President of the United States, the United States Tariff Commission, and Congress to secure such modification of the act as will permit the importation of game birds for stocking purposes free of charge. It was also directed that every effort be made to secure a refund of such sums as have been paid to the government in duties by the various state game departments.

Sessions of the American Fisheries Society were poorly attended on account of a storm.

CANADIAN REGULATIONS REGARDING SANCTUARIES.

Following are some of the essential regulations for the control of bird sanctuaries in the Dominion of Canada:

Bird sanctuaries shall be under the control and management of the Commissioner of Dominion Parks. Private use of these sanctuaries is prohibited except under special permission or lease granted prior to the date of the creation of the sanctuary.

Within a sanctuary, the killing, capturing, taking, injuring or molesting of migratory game, migratory insectivorous or migratory non-game birds, or the molestation of their eggs or nest is prohibited, with this exception, that the shooting of wild ducks and wild geese may be allowed in any year under permit from the Commissioner of Dominion Parks, in such portions of a bird sanctuary and during such time as the minister from time to time shall decide.

Within a sanctuary, the carrying or possession of firearms and decoys is prohibited unless special permission is granted by the commissioner.

Cats and dogs found upon a bird sanctuary may be destroyed by any game officer. Sporting dogs, however, may be brought upon a sanctuary or any portion thereof where shooting of ducks and geese is allowed during the open season.

NEW FISH PLANTING FILM SECURED.

A splendid new film, depicting the proper method of planting young fish in streams of the state, was recently donated to the commission by Pathe. It shows the method of icing and aerating the cans, and of transporting by pack train and by man. It is at times necessary to transport these cans of trout on the backs of men, using a special harness for the purpose, for certain types of rugged, boulder-strewn country are inaccessible to mules.

This film will be used during the winter months by the Bureau of Education and Research, in illustrated lectures before leading sportsmen's clubs, nature study clubs and high school student bodies throughout the state.

Prior to fish planting time next season, it is proposed to show the film before each group handling the fish planting in various sections of the state. Next year's plantings are all to be made under the direct supervision of trained employees of the Commission, assisted by volunteer planting crews from the various sportsmen's clubs.

OCEAN INDUSTRIES VS. CALIFORNIA FISH AND GAME COMMISSION.

During the month of October, the concrete ship *Peralta* was towed from San Francisco to Monterey Bay. The vessel is equipped as a floating fish-reduction plant, and is owned by The Ocean Industries Company, a Nevada corporation.

This concern is seeking to evade the laws by disputing the interpretation of the three-mile limit. Accordingly, the *Peralta* was moored within Monterey Bay, but at a distance of three miles from any point of land. Here she commenced to reduce to chicken feed and fertilizer the immense hauls of fish brought to her by the purse seine boats.

The Fish and Game Commission secured from the superior court of Santa Cruz County a temporary restraining order preventing the Ocean Industries Company from operating. On October 18, Mr. Greene, at the head of a large force of deputies, seized two of the purse seine boats, and nets valued at nearly $8,000. The Ocean Industries then sought a temporary writ in the federal courts restraining the Fish and Game Commission from interfering and for $10,000 damages, plus $1,000 a day for each day that the *Peralta* was idle. On October 23, Judge A. F. St. Sure ruled in this case that all of Monterey Bay was within the jurisdiction of the state and later dismissed the suit for damages. On October 28, the decision was reaffirmed by Superior Judge H. F. Lucas. On November 16, the final hearing was staged in the Supreme Court at Sacramento,

upon a petition by the Nevada corporation to prevent the superior court of Santa Cruz County from enforcing its injunction, but up to date the verdict is still pending. Despite rumors to the contrary, the *Peralta* is not operating, and can not do so unless a decision is rendered in her favor. This seems extremely unlikely, in view of the fact that every court thus far has supported the Fish and Game Commission.

This case is of extreme importance, because, should the Ocean Industries win it the wholesale and indiscriminate destruction of fish off the California coast would cripple, if not ruin, the fish packing industry. The leading fish canners realize this, and they are therefore giving their whole-hearted support to the Fish and Game Commission in its attempt to establish the limit three miles beyond a line joining the headlines of any bay.

REINDEER INDUSTRY IN ALASKA.

The Bureau of Biological Survey has recently issued a pamphlet entitled "Progress of Reindeer Grazing Investigations in Alaska," by Lawrence J. Palmer (U. S. Dept. of Agriculture, Dept. Bull. No. 1423). Some of the more interesting items are quoted below:

"The stock of 1280 reindeer imported from Siberia into Alaska between the years 1892 and 1902 has increased to approximately 350,000, not including about 125,000 utilized for food and clothing. The annual gross increase in herds is between 33 and 45 per cent. About a third of the Alaskan reindeer are now under white and two-thirds under Eskimo ownership in individual and company herds. One incorporated company owns about 50,000 reindeer in six herds.

"In the two years 1924 and 1925 reindeer meat weighing more than 1,000,000 pounds was exported from Alaska, and a steady increase in the output and in the demand for it is indicated. The meat is fine-grained, compares favorably with beef, and when fresh is exceptionally juicy and tender.

"A rapidly growing industry requires that scientific studies be made for its best development, and under congressional authorization such studies were begun by the department in 1920 through the Biological Survey. Improved methods have been recommended to herd owners for handling reindeer and utilizing the range, and investigations on these lines are being continued, with the reindeer experiment station of the Biological Survey at Fairbanks as a center. A study of range units is being made with the view to inaugurating a permit system of grazing allotments. Careful and continuous inspection will be required to determine whether an area is being under or over grazed.

"Of the two types of reindeer in Alaskan herds, the long, rangy type is usually heavier and better for meat production. The dressed weight of a carcass averages 150 pounds, with 300 pounds as the maximum. Experiments in the development of a heavier type are being conducted on Nunivank Island through crossbreeding with caribou bulls captured in the interior of Alaska and transported to the island for the purpose.

"The use of sled reindeer is recommended for herd management and other transportation uses, and studies have been made in breaking and training the animals and in feeding them on other than a lichen diet.

"Reindeer have been successfully fed grain and hay with other cultivated crops, and lichens are found not to be essential to their maintenance. As a ready source of food, lichens will continue to be the chief sustenance of the herds, however, and are what make reindeer grazing possible in Alaska. Studies will be continued to determine the effect of a varied diet on meat quality.

"Grazing in Alaska is tending toward permanent ranches with natural boundaries, each grazing unit having its own summer and winter ranges. Under a fixed-allotment system open herding is found more practicable than the close herding introduced by the Lapps.

"Winter grazing requires a greater acreage per head than summer. Year long, from 40 to 60 acres for one reindeer is indicated—10 or 15 for summer and 30 to 45 for winter grazing. About Norton Sound the acreage per animal is 40 to 45, and farther north, 50 to 60. These figures furnish a basis for determining the future carrying capacity of definitely marked areas. The areas available to grazing in Alaska should ultimately support 3,000,000 reindeer, a third of this number on the coast section now occupied.

"Full progress in the reindeer industry can come only from the adoption of better management methods, not only in range control and regulation but in herd management and provisions for transporting and marketing the meat. This involves open herding, reduction of the proportion of bulls in the herds, selection of the best stock for breeding, infusion of new blood by transferring bulls and cross breeding with native caribou, adoption of improved methods of corralling, branding, and cas-

tration, keeping sled reindeer in each herd, and providing for herd ownership on the percentage basis for increases, with one registered brand for a community herd, and for cold-storage facilities to assist in marketing."

FEWER FISH IN GREAT LAKES.

More than 100,000,000 pounds of fish have been taken yearly from the Great Lakes for the last fifty years, the Bureau of Fisheries tells "Capper's Weekly." The high point was in 1922, when the yield was 140,000,000 pounds, valued at $9,000,000. Lake Erie, second smallest of the Great Lakes, produces about half the fish yield of all the Great Lakes combined. In 1922 the catch of Lake Erie amounted to 54,000,000 pounds, but the latest reports from Lake Erie indicate production has fallen greatly. The pollution of the water of the lake, which is virtually unrestricted, and intensive fishing, are believed to be partly to blame.—*New York State Fish, Game and Forest League.*

PRESIDENT INCREASES AREA OF WILD LIFE RESERVATION.

By Executive order of October 2, 1926, President Coolidge authorized the reservation of several tracts of marsh and overflow public lands, to be included in the Upper Mississippi River Wild Life and Fish Refuge, administered by the Bureau of Biological Survey in cooperation with the Bureau of Fisheries. The new refuge was authorized by Congress two years ago, to extend along both sides of the Mississippi River from Rock Island, Ill., to Wabasha, Minn., a distance of approximately 300 miles, and about one year ago the President by Executive order included in it all islands owned by the United States within the limits of the reservation but formerly withheld from public entry for the use of the War department in connection with possible improvements of navigation on the upper Mississippi. The new order adds approximately 960 acres to the refuge, among which are a number of small islands and overflow areas along the mainland on either side of the river. The tracts in the State of Illinois comprise 224 acres; in Iowa, 321 acres; in Minnesota, 146 acres; and in Wisconsin, 268 acres. The issuance of the Executive order of October 2 was on recommendation of Secretaries Work and Jardine. Additional overflow areas suitable for the birds and other wild life on the refuge are being surveyed and acquired by gift and purchase through the office of the Biological Survey at Winona, Minn., in charge of W. T. Cox, superintendent of the refuge.

FEDERAL AND STATE GOVERNMENTS COOPERATE TO ENFORCE GAME LAWS.

The recently published directory, compiled in the Biological Survey, United States Department of Agriculture, of officials and organizations concerned with the protection of birds and game (Department Circular No. 398–C), shows the character of the many groups interested in the conservation of wild life. The protection of game animals and birds, fur animals, and fish is seen to be backed by the federal government, by state governments, and by international, national, state, and local organizations, and is encouraged by Audubon Societies and other nature clubs. So numerous are these that purely local organizations are omitted from the directory, and only those are listed that are of state-wide scope or larger. These number 210, of which 70 are governmental agencies, 19 are international, national, or Canadian organizations, and 121 are state or provincial associations, including Audubon societies and state divisions of the Izaak Walton League of America.

Whereas the functions of all have to do with the encouragement of wild life conservation in an educational or other way, actual enforcement of game, fur, and fish laws is in the hands of federal or state governmental agencies. The publication of the coordinated lists of the officials and organizations is only one form of cooperation on the part of the federal government. In the enforcement of the game and fur laws there is also cooperation of such direct nature as to give concern to violators and others not inclined to observe the laws. Two concrete examples will demonstrate how the federal and state governments are cooperating, one showing how a state is assisting in the enforcement of federal game regulations and the other how the United States game wardens employed by the Biological Survey aid the various states in apprehending violators of their game and fur laws.

STATE COOPERATION

Recent Federal regulations under the migratory-bird treaty act made the opening date of the season on wild ducks in California October 16, and thus rendered ineffective the provisions of the state law that would have opened the season on

October 1. Under the same regulations the season might continue until January 31, except for the fact that the California law now in force would be violated by hunting after January 15. Both the state law and the federal regulations contemplated a season of 3½ months, but the 4 months maximum extent under the conflicting dates is actually shortened to 3 months, the federal regulations cutting off the first half of October allowed by the state, and the state law lopping off the last half of January provided by the federal regulations.

To help enforce the federal regulations, the California Fish and Game Commission not only gave wide publicity to the deferred opening date but at the same time served warning that the provisions of the regulations adopted by the Secretary of Agriculture and promulgated by the President would be rigidly enforced by all its state wardens, who were instructed to cooperate with the United States wardens to this end. The only hope that California's sportsmen have of enjoying a full waterfowl season of 3½ months lies in the possibility that the state legislature, when it meets in January, 1927, may act on a proposed measure to add two weeks to the end of the season to make it conform with the season allowed under the federal regulations.

FEDERAL COOPERATION

The federal government in turn can give assistance to state authorities through the fact that United States game wardens, in the course of their activities in the enforcement of the migratory bird and other federal game laws, constantly encounter violations of state laws. Each of these wardens is thus in position to render substantial cooperation to state authorities in the enforcement of their game, fish, and fur legislation. Examination by United States game wardens of the records of raw-fur receiving houses has proved a fertile field of cooperation, and thousands of reports of apparent violations of state laws protecting fur animals and regulating the shipment of pelts are annually referred by federal wardens to state game authorities for investigation. In many instances it is necessary to follow up these reports and still further aid the state in prosecutions by obtaining consignee affidavits covering the receipt of shipments and the original canceled checks for payment, and in many cases the original correspondence between the shipper and the consignee. There is a good percentage of state convictions based on this information, and the value of this federal service is being more and more appreciated by the various state game departments. For the past few years penalties and forfeitures accruing to the states as a result of information furnished by United States wardens have amounted to from $20,000 to $25,000 annually.

FACTS OF CURRENT INTEREST.

Whereas tagging experiments are showing that salmon from the entire Pacific Coast migrate to the waters of British Columbia to find feeding grounds, similar experiments with halibut off the coast of Washington are showing that halibut are restricted to small areas. In one instance, 70 per cent of tagged halibut have been retaken on the same bank.

Favorable reports on valley quail have been received from all parts of the state. Quail have been appearing in great abundance in many of their former haunts, apparently due to a couple of good breeding seasons.

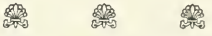
The catch of salmon has been decreasing steadily. That the future of king salmon in California waters is threatened is the decision of experts.

Albacore have again been caught in sufficient numbers in the Monterey Bay district to furnish local markets with fresh fish of this variety.

A number of changes in game laws have been proposed by the Fish and Game Study Committee of the California Development Association. Discussion of the report of this committee received first place on the program of the California Sportsmen's Convention held at the Hotel Whitcomb, San Francisco, December 9-10, 1926.

The splendid cooperation of judges in the enforcement of fish and game laws continues. Fines are such as to deter the habitual violator and warn those who are ready to commit minor violations.

A crystallized sentiment favoring better protection for the Pismo clam is now evident.



The twenty-ninth biennial report of the California Fish and Game Commission, which details the work and accomplishments of the last two fiscal years, is off the press and is available at your public library or on written application to the Commission.

The total distribution of trout for the past two seasons amounted to 59,524,700; of salmon, 14,157,150.

COMMISSION ACTIVITIES.

Department of Fish Culture.

Spawning of salmon at the Klamathon Egg-Taking Station began on October 17th. By the end of that month, over 5,000,000 eggs had been secured. Part of the take was sent to the Fall Creek Hatchery and the remainder to the Mount Shasta Hatchery.

Continued attempts are being made to keep the Klamath River well stocked with young trout in order to compensate for the concentrated fishing of the past few years. Last fall, 50,000 rainbow trout were planted above the Copco Dam and 150,000 in tributaries of the Klamath.

Attempts were made last fall to secure eastern brook trout eggs at Gull Lake. Resort to a seining method was necessary. An additional stock of eggs of the eastern brook are badly needed since brook trout at the Mount Shasta Hatchery have shown signs of weakness in the past year.

Elsinore Lake, in Riverside County, received a shipment of 3000 blue-gilled sunfish and 500 crappie. Since the water of this lake is brackish, the plant may not be successful. If it is not successful Superintendent of Fish Culture Shebley suggests the planting of the orange sunfish, a fish which can withstand considerable alkalinity.

Clear Lake, in Lake County, has received a new stock of catfish. This time a plant of 4000 forked-tail, or channel, catfish was made.

Biologist Coleman has continued a biological survey of Mono Lake. Particular attention is being paid to the natural food and the possibility of improving the food supply. A knowledge of the food present in the lake, or stream, may well determine the kind of fish adapted for each place.

A shipment of Ayu eggs from Japan, the third shipment made, arrived November 1st. Unfortunately the shipment was so badly infested with fungus that none were hatched, though every effort was made to save the eggs.

The salmon run on the Klamath River was greatly hindered by a sand-bar which formed at the mouth of the river. Interested persons attempted to keep the channel open, but this was accomplished with difficulty. During October the Klamathon Spawning Station reported but one-half the number of salmon in the racks as compared with last year.

One observer on the Klamath reported a count of 316 anglers on a stretch of 20 miles near Hornbrook. With such concentrated fishing, it would appear that maintenance of the splendid runs of fish would be increasingly difficult.

FIG. 9. Young ring-necked pheasants at Yountville Game Farm awaiting distribution. Photograph by H. C. Bryant. September, 1926.

Department of Patrol.

Never in the history of game legislation in the State of California has the Fish and Game Commission received such splendid support from the judges. Some of the most interesting cases of the last two months, recorded below, give evidence of this changed attitude.

Arrest by Deputy Post, fine $100, violation 2 quail.

Arrest by Deputy Post, fine $250, violation doe.

Arrest by Deputy Sellmer, fine $100 and 60 days, violation fawn.

Arrest by Deputy Holmes, fine $300, violation pumping oil in Noyo River.

Arrest by Deputy Carpenter, fine $100, violation 52 ducks.

Arrests by Deputies Lencioni and Von Arx, 90 days each, violation trapping quail and honker goose.

Twenty-seven arrests for breaking deer law, nineteen for not having a hunting license, sixteen for shooting quail out of season, and eighteen for shooting or trapping non-game birds were made in October.

During the month of October, 3000 fishing licenses were checked by deputies of the Commission. A large number of seizures were also credited to this month. The 194 dollar-a-year deputies made ten good cases besides accomplishing other excellent work. During September, 204 arrests were made, the total in fines aggregating $7,909.

Deputy A. Bullard brought a violator into court for killing at night. The judge considered both counts and fined the violator $400.

Judge John M. Hoesch, of Morgan Hill, has supported Deputy C. E. Holladay in efforts to clean up the situation in Santa Clara County. During September, three men apprehended with two ducks, three cottontails and one blue heron, paid a total fine of $200 when arraigned before the judge. During October, one violator, with deer meat in his possession, paid $125. Non-game birds cost two other violators a relatively great sum, for one caught with five robins paid $100 in fine, and another caught with six robins paid $150.

On information from Captain Allred, of Humboldt County, a car containing crabs was stopped at Willits by Deputy Hellard. The man arrested was awarded $180 or 180 days in jail.

One of the finest instances of a judge's cooperation in fish and game protection was pointed out recently at Willows, where Justice L. P. Farnham assessed a jail sentence of 210 days against a professional duck hunter found in possession of forty-eight ducks. This man has been taken three times previously and fined in Colusa County courts. The fines appeared to have no effect. Judge Farnham felt that a jail sentence would give the violator time to ponder his error. Accordingly, the judge imposed a sentence of fifty days for exceeding the bag limit; seventy days for using an unlawful gun, and an additional ninety days for shooting at night, making a total of 210 days. At any rate, the duck season will close before he is released and the ducks will be safe from this exterminator. Wardens Bruce L. Hammock, of Potter Valley, and George Thompson, of Gridley, made the arrest. Credit is also due to Patrol Captain S. J. Carpenter, who skillfully engineered the case.

Justice Hermann Rudolff, of Novato, recently assessed a limit fine against four violators brought in by Warden Walter B. Sellmer. These men all gave San Francisco as their addresses. When taken they had numerous quail out of season and non-game birds. "They killed everything from a hummingbird to a quail," said Sellmer. Judge Rudolff assessed a fine of $600.

Justice John A. Ellis, of Geyserville, assessed a fine of $100 for killing wild pigeons to a violator brought in by Warden J. H. Groves, of Cloverdale, assisted by Patrol Captain Henry Lencioni, of Santa Rosa.

Judge George B. Reckers, of Williams, gave the option of "$100 or 100 days in jail" to two men charged with night hunting by Wardens J. V. Shearin, of Stonyford, and L. W. Dinsdale, of Woodland. Both went to jail. Score another for the ducks.

On September 27th, Walter R. Welch, of Stockton, California, was appointed as special field assistant to have charge of the organization and education of dollar-a-year wardens. Mr. Welch made such a success in organizing the wardens work-

ing under the San Joaquin Fish and Game Protective Association, and under Deputy Jack O'Connell, that he was chosen to head this important work. Since these dollar-a-year men only devote a portion of their time to law enforcement, it is all the more necessary that they be well trained in order that their service may be the most effective. Mr. Welch will endeavor to instruct dollar-a-year wardens so that they may conduct themselves in such a manner as to command the confidence and respect of the people and bring credit to themselves and those responsible for their appointment.

FIG. 10. A special pheasant food from Asia called proso is being grown at the Yountville Game Farm. This is considered one of the best natural foods yet found for the ring-necked pheasant. Photograph by H. C. Bryant.

From all parts of the state have come reports of the excellent work of the dollar-a-year wardens, particularly in those cases where they have worked in conjunction with, and under the direction of, regular wardens.

Department of Commercial Fisheries.

At the suggestion of canners, the Fish and Game Commission has appropriated $15,000 to finance investigations relative to the canning of fish. This sum has been turned over to the Hooper Foundation of the University of California. Under the direction of Dr. K. F. Meyer, several scientists will be employed to solve important problems bearing on the canning industry.

During November, a large number of canners gathered at a banquet to celebrate the opening of the laboratory in which the work will be done.

During September an analysis of the albacore boat catch was made. In attacking this problem, new methods in fishery research were employed which constituted an original contribution. This analysis will be included in the forthcoming report on the albacore.

During the past summer, further statistics were gathered on the catches of rock cod. It will be remembered that attention has been given the rock cod fishery because of signs of depletion. The main interest continues to center on the albacore and sardine. However, a few side investigations, that have timely importance, are being undertaken. In this connection some new men have been detailed for work on the barracuda. The work will include a careful search of liter-

ature together with study of the catch and the microscopic study of scales to determine age and rate of growth.

Bureau of Publicity.

The number of newspapers that print the publicity items issued by this bureau continues to increase. During the month of October, twenty-two stories, many of them relating to water pollution, pheasant planting, and to change in game laws were issued. Dependable information on the work of the Commission is now reaching the residents in the mountain districts, as well as those in cosmopolitan centers.

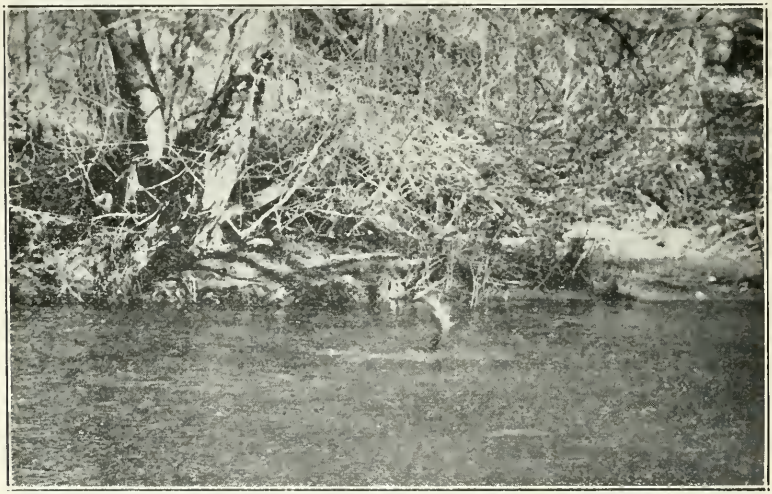


FIG. 11. Trout jumping in pool at Beaver Creek Egg Collecting Station. At this station one of the new self-operating traps with concrete piers has been installed. Photograph by Lawrence A. Perry. April, 1926.

Bureau of Game Farms.

Planting of pheasants in southern California continued during the month of October. Shipments totaling 1200 birds were sent south and plants were made in Bakersfield, Santa Barbara, Colton, Temecula, Chino and El Centro. A shipment is still being held for planting near Fresno.

One of the most interesting liberations was at Solvang, near Santa Ynez Mission, on Saturday, October 16th. Here E. H. Lewis of the California State Game Farm, assisted by officials and members of the Santa Barbara County Sportsmen's Club, Patrol Captain C. S. Bauder of the southern California district, and Game Warden Frank Dunne, set at liberty more than 250 birds, all of them over five months old. A beautiful setting in green alfalfa fields along the Santa Ynez River had been chosen for the future home of the birds, upon which there is a closed season until such time as the state legislature sees fit to declare the birds prevalent in sufficient numbers to warrant a short shooting season and limited bag.

More than 75 residents of Santa Barbara County, drawn from every section of the region, were in attendance to welcome the birds and witness the liberation.

Other liberations were made on the Cooley ranch, near Colton in San Bernardino County. Both locations were pronounced excellent by Mr. Lewis.

Commissioner Ralph H. Clock, of Long Beach, attended some of the game bird plantings and urged local sportsmen to protect them until such time as they had established themselves and their kind in quantities. At Solvang, the local justice of the peace declared that any violator of the law, governing taking of pheasants brought before him would be given the maximum penalty.

Considering the late start, the output from the State Game Farm during the past season was remarkable. About 4000 pheasants were successfully reared and planted in various parts of the state. A

breeding stock of about 400 hens and 100 cocks will be held for next season's operations. This breeding stock will provide about 25,000 eggs and it is hoped to approach the 15,000 mark with young birds.

The pheasants liberated from the game farm along the Napa River in the vicinity of Yountville appear to be thriving. Birds are seen regularly and some of them have moved as far as two and one-half miles up the river.

Bureau of Statistics and Game Problems.

Concerning itself with the mass of statistical data necessary for a proper study of game conditions in California, and of the diseases affecting wild life of the state, the California Fish and Game Commission announced in October the creation of a new bureau to be known as the Bureau of Statistics and Game Problems. Roy E. Ludlum, for many years an employee of the Commission, an expert statistician and student of game diseases, has been placed at its head. Robert J. Irvine, graduate chemist and bacteriologist and formerly with the Bureau of River and Harbor Pollution, has been transferred to the new bureau. Mr. Irvine's activities will be along research lines, directed by Dr. Karl F. Meyer, of the Hooper Foundation of the University of California. Dr. Meyer recently agreed to supervise personally all research work of this character conducted by the Commission, provided the necessary assistance was given him. Creation of the new bureau was the result.

Its activities have been outlined as follows:

1. To prepare all statistical data for the patrol department.
2. To take charge of all game breeders' licenses and activities.
3. To investigate all animal and bird diseases in the State of California.
4. To cooperate with the Hooper Foundation of the University of California where the bacteriological and physiological investigation work will be done.

Mr. Irvine will continue to handle bacteriological and chemical analyses for the Bureau of River and Harbor Pollution.

FIG. 12. Bar at the mouth of the Klamath River. Last year the river was exceedingly low. Photograph by Ruth K. Roberts.

Progress is being made on the study of bird diseases, which, it will be remembered, is under the charge of Dr. K. F. Meyer, of the Hooper Foundation of the University of California. A number of specimens of sick ducks from Tule Lake have been examined, and in addition a careful study has been made on normal ducks in order that pathological conditions may more readily be recognized.

In addition to studies of duck disease, attention is being given the birds at the game farm. Several live pheasants have been shipped to the laboratory and blood serums and other bacteriological tests are being made on these healthy birds so as to know these birds in both health and disease. Post mortems of all birds which die at the game farm are being made. Under such favorable auspices,

worthwhile results in the prevention of bird and mammal diseases are to be expected.

Bureau of Screens and Ladders.

An outstanding accomplishment is the clearing up of a difficult situation that has existed on the Sacramento River near Redding, owing to the inability of salmon to pass beyond the dam of the Anderson Cottonwood Irrigation District. The matter has finally been adjusted and all sportsmen and conservationists will be glad to hear that a fishway built on correct principles is actually being installed.

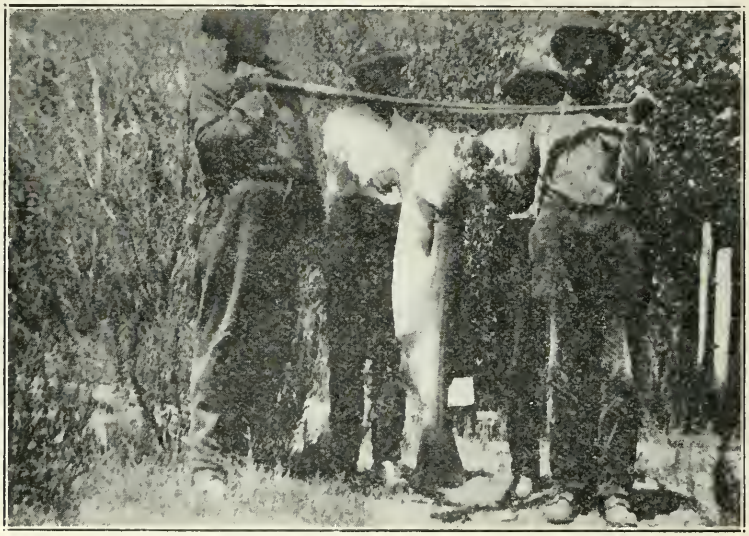


FIG. 13. A 38-pound striped bass, 48 inches in length, caught by John Gerber on the Sacramento River, near Sacramento, season of 1926. It took 45 minutes to land this fish. Photograph by John Gerber.

It is hoped that with the completion of this fishway, salmon will again appear in numbers at the spawning station of the United States Bureau of Fisheries located at Baird, Shasta County.

Reports were at hand on December 15, 1926, that fifty-nine screens were in successful operation. Every installed screen will be inspected as soon as possible and records made as to its effectiveness. Similarly, every ditch reported as needing a screen will be inspected and the proper installation recommended.

On the same date forty-three fishways were reported as operating successfully. Several others are being repaired and several new installations are being made.

A large map mounted in the offices of the Bureau of Screens and Ladders now shows all of the more important installations made by the Bureau.

Engineer Spencer inspected the much advertised Baker Dam "lift" in Washington during November and attended the meeting of the International Pacific Salmon Investigation Federation, at Seattle. Mechanical difficulties connected with proposed lifts to replace fishways over high dams are easily surmounted as compared with the biological problems involved.

Some difficulty has been experienced in the past in securing data relative to new diversions of water. Since all diversions of water from streams in California are of importance because of the necessity of screening ditches and building fishways over dams, such information is necessary. The future, however, looks bright in this respect for the Division of Water Rights has promised to furnish the Bureau of Screens and Ladders, a copy of all applications for the appropriation of water. This will afford an opportunity to furnish every applicant with a statement pointing out the necessity for complying with the laws relative to screens and ladders.

Bureau of Pollution.

Numerous reports received relative to pollution have been followed up by the bureau. In some cases, as for instance, with a wrecked ship off the north coast, it was found impossible to do anything in that the damage had already been done. Many other cases were amicably settled by taking the matter to officials of the company concerned. Since the establishment of this bureau, more active work on cleaning up bad situations has been done than for several years previous. Now that people find that there is a bureau that can be depended upon to go into the matter and make proper adjustments, two things are evident. First, conservationists are keeping the Commission informed regarding bad cases of pollution, and second, companies, of their own accord, are using every means to prevent serious pollution of harbors and streams.

Beginning with November 1, 1926, Mr. John Spencer, hydraulic engineer, assumed charge of the Bureau of Pollution.

Cooperation with other Pacific Coast states looking toward uniform anti-pollution laws is planned. Many streams flow through two or more states and without uniform laws, enforcement is difficult.

The results of many chemical analyses are now on file in the office as a permanent record. These are helpful in new problems.

The first case for the disregarding of section 635 California Penal Code relating to pollution of rivers and harbors of the state by oil and other effluent "deleterious to fish, plant and bird life," was filed on November 8th in the superior court of Los Angeles County. The defendants are seventeen of the leading oil producers of the Signal Hill field. The Commission is seeking an injunction to prevent those companies from operating their wells, skimming stations or dehydrating plants until such time as they have stopped placing waste water, heavily polluted with oil, in natural waterways, from whence it passes into Long Beach harbor.

These actions are the result of a long investigation instituted in September by Major Rolin G. Watkins. In this investigation Major Watkins was assisted by city officials of Long Beach and members of the Long Beach Police, Health and

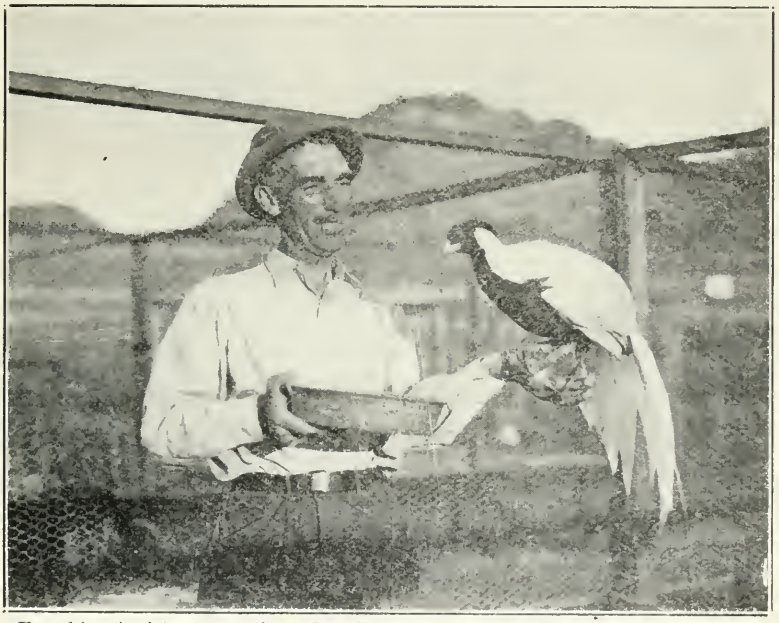


FIG. 14. Assistant superintendent Lewis, of the Yountville Game Farm, with male silver pheasant, one of the show birds of the farm. Photograph by H. C. Bryant. September, 1926.

Engineering departments. During the course of this investigation it was disclosed that fish were being killed by the oil discharged from the seat of drilling and pumping operations on Signal Hill, and that it was impossible for fish to live in the natural waterways carrying the oil polluted waters into the harbor. Cases of fatal effects upon bird life were also disclosed by the investigation.

LIFE HISTORY NOTES.

STATUS OF THE GOLDEN EAGLE IN SOUTHERN CALIFORNIA.

I note with interest the report of Mr. W. C. Hanna.* of Colton, in regard to the status of the golden eagle, *Aquila chrysaetos*, in southern California, and wish to record my observations on this bird for the last ten years here in the south.

I have had up to twenty-five pairs under observation during this time. I have not located the nests in anywhere near all cases but the birds have been seen in the same general localities from year to year and no doubt nested there in nearly, if not all, cases. There are only three pairs that have been missing these last few years—one near the coast where the land has been cut up into city lots right up to their nesting cliff; naturally, in this instance the birds had to go, and whether they have moved back into the hills to another nest or whether they have passed out of the picture altogether, that I have no way of knowing. However, it is a well known fact that each pair of golden eagles usually has several nests and that they are apt to use them in rotation from year to year. The other two pairs had their nests upon cliffs in the desert, far from human habitation, and I think that their leaving the locality was due to the unusual drouth of these last few seasons, which caused a shortage of their natural food, that would be none too plentiful even under the most favorable conditions. Neither of these two pairs were ever robbed of their eggs or young, as far as I know, and one pair raised young the last year it was there. It will be interesting to see whether they will return to the old nesting sites during seasons of heavy rainfall.

It surely is a fact, as Mr. Hanna states, that the trappers catch a large number of these birds every year, and certainly something should be done, if possible, to stop this unnecessary waste of so fine a bird. I have talked with many trappers and each tells me the same story: some turn the birds loose and others simply kill them, especially if they are seriously crippled. One fine female was brought to me last spring that had been badly hurt in a trap.

There is another condition that is not too satisfactory. Hunters in general (perhaps I am too pessimistic) shoot everything that moves, and seem to think that they have a right to do so, with the result that the American osprey, white-tailed kite, and many other of our large, less wary, beneficial and beautiful species are on the way to oblivion as far as we are concerned. However, be that as it may, I must still maintain that considering the enormous numbers of hunters afield and the natural encroachment of civilization upon their nesting grounds, that the golden eagle is holding its own far better than is perhaps to be expected here in southern California.—Wright M. Pierce, Claremont, California.

BRINGING BACK THE QUAIL.

About ten years ago I bought a ranch in the hills west of Crows Landing. This ranch in former years was a great quail country and carried large coveys of them. Nearly all had been shot before I bought the ranch, there being not more than two or three dozen left. They were hunted off and on and had no chance to increase until about four years ago. At that time I posted the place and explained to the people who had been hunting there that my object in stopping hunting was to see if I could bring back the quail. There has been very little hunting since and the sportsmen are with me in my experiment.

There was a very noticeable increase in the quail each year. Two years ago I put in some new stock that had been caught along the Tuolumne River, nine females and three males. Since then there has been a noticeable increase. It has been estimated by people who have seen them this fall that there are twelve or fifteen hundred birds. Another thing I have noticed is that there are several large coveys of quail on adjoining lands that were barren a couple of years ago. I have no doubt as to where they came from.

In regard to predatory birds and animals, there are a few hawks, plenty of bluejays, some coons, skunks and coyotes. Formerly there were foxes and wildcats, but I have not seen any for some time.

*Hanna, Wilson C., Destruction of Golden Eagle in California. CALIFORNIA FISH AND GAME, Vol. 12, No. 3, p. 153, September 1, 1926.

There have not been any of these predatory birds or animals killed in several years to my knowledge. Also we have had several partly dry years which were not favorable to quail, as they do not pair off in extremely dry years and only partly in the short years.

Restrict the man with the gun, and the quail will come back.—J. E. Newsome, Newman, California.

A MEAT EATING TROUT.

In August, 1926, while fishing on Hollow Tree Creek, Mendocino County, I landed a large rainbow trout. Being interested in the food of trout, I opened the stomach and was surprised to find in addition to remains of crayfish, a sizeable salamander. This salamander was not the typical, reddish "water dog," but was apparently a marbled salamander.—E. H. Kocher, San Jose, California.

PILOT FISH.

A *Naucrates ductor* or pilot fish was caught out of San Diego by a fishing boat, fishing for Van Camp's Cannery, on August 13, 1926. One specimen was brought in, but the fisherman, captain on the *Balboa*, reported he had seen a small school of them. This can not be substantiated, as no more have been caught or seen. This fish is closely related to the yellowtail, but very uncommon. It is reported by Edwin C. Starks that it has only been caught once or twice on our coast. The pilot fish has about five broad dark bars extending from the back to the lower part of the body.—S. S. Whitehead, San Diego, California.

THE MOUNTAIN SHEEP IN THE SAN JACINTO REGION.

The present rarity of the mountain sheep, of the subspecies *Ovis canadensis nelsoni*, makes it of interest to conservationists and to laymen in biology to put on record any information that may come to hand regarding this splendid animal. There are rather indefinite reports from time to time concerning its presence in the broken country east of the San Jacinto Mountains in southern California. These rumors undoubtedly have good foundation, and yet they are mere rumors and not definite records. It was, therefore, with considerable degree of interest on my own part that I came upon sign of this animal, while exploring certain canyons south and west of Kane Springs on the Colorado Desert.

On November 26, 1926, a party from the University of California, Southern Branch, visited the so-called petrified forest in this neighborhood, and traveling up the canyon for some five or six miles beyond the point known as First Palms, we began to encounter detached specimens, of at first unidentified skeletons, a vertebra, then a limb fragment, sometimes badly bleached or weather worn; finally, however, sufficient material was assemble to identify the animal as a large sheep. In the progress up canyon we finally discovered a complete skull of a ram and came soon upon its decomposed carcass, almost entire; at another point, the skeleton of a lamb of perhaps one year or less age; farther still, the weathered skull of an adult female. This exciting chase finally consummated at a water hole, or what the Mexicans call a *tinaja*, a mere basin in the rock which held rain water. About this *tinaja* the tracks and droppings of sheep were extremely abundant, some of them having been made within the last twelve hours presumably. The water in the hole was very low and extremely offensive in odor. Floating in the water was the carcass of a lamb and stranded on the farther edge under the cliff, the carcass of an adult female. The precipitous sides of the basin were such as to prevent an animal from getting out once it had fallen into the water.

On circling the basin by climbing out of the canyon from a point below we found a gorge above the water hole, of extreme depth and narrowness. At the bottom of this gorge were the remains of two other sheep. One of them showed fracture of the hip bones and parts of the backbone. These various bones were gathered up carefully and brought back to camp. An analysis showed that at least nine individuals were represented in the accumulated mass.

At a point above the water hole on the mountain side, commanding a view both up and down the canyon, there had been built a rock wall about two feet high encircling a little depression in which a man could lie concealed and observe the surrounding country. We searched the vicinity very carefully for empty cartridges or for arrowheads but nothing of that nature was discovered. We have no reason to believe that the animals, whose remains we found, had been slain by man. Their presence in the bottom of the gorge and the fractured pelvis could properly be explained by accident befalling the sheep that had tried to reach the water, driven by the extremity of thirst (if these sheep ever experience thirst) at the end of a long dry season.

Down the cnayon about a mile below the water hole we found evidence of an old camp, cast-off shoes, tin cans and tobacco boxes. In the neighborhood of this camp, after careful search, we found the remains of the legs of one sheep clearly cut off from the fresh carcass. This constitutes the only evidence we have of infraction of the law. All the other sheep found showed no signs of having been slaughtered and no signs of any part having been carried away by man. It is, of course, barely possible that a depraved individual slew them and let them lie. It seems a more plausible explanation that the sheep met their death in attempts to reach water or perhaps even more plausible in case of an animal so wonderfully sure-footed and so incredible a mountain climber, that the sheep remains about the water hole may be in part the result of some disease comparable to the hoof and mouth disease that had, at least, reduced their vitality or dulled their judgment and driven them to the vicinity of water where they perished.

The remains of these individuals so far as it was possible to get them back to camp are carefully preserved in the university collection so that they will be available for study by the scientists who may need such material. A second visit to the locality will be made later on to gather up the remains of those that were at that time "unapproachable."

It would seem then that a fair colony of these interesting animals has persisted in these desert ranges, and that at least some of the colony still survive in the neighborhood, and that the individuals make frequent visits to the vicinity of the water hole.—Loye Miller, University of California, Southern Branch, Los Angeles, California.

FIG. 15. Pintail ducks on Victoria Island, San Joaquin County. October 26, 1926. Photograph by Wm. H. Armstrong.

CONSERVATION IN OTHER STATES.

FIVE MAN COMMISSION APPOINTED IN VIRGINIA.

A Commission of Game and Inland Fisheries has replaced the office of Commissioner of Game and Inland Fisheries in Virginia. The five men appointed met for organization last summer and committees were appointed to investigate matters pertaining to pollution of streams and the state game farm. The number of game wardens was reduced to 120 men including the ten supervisors. The plan is to pay the warden force larger salaries and have them devote more of their time to the service. Plans are also being made to increase the number of game sanctuaries.

DEER IN NEW YORK.

A recent survey of game conditions in the state of New York has shown that there is a shortage of deer in two of the divisions in the northern part of the state. In sections with no open season, the deer have increased to such an extent and are so destructive that an open season is being considered. The deer seem to be moving out of the unprotected districts into the counties where a permanent closed season gives them

sanctuary; however, if the deer increase in these protected areas because of the establishment of more and larger game sanctuaries, it is believed that within a few years, the open season on deer will be state-wide.

OHIO'S AUXILIARY GAME REFUGES.

A report appearing in the November issue of *The Oregon Sportsman* states that the state of Ohio has more than 100,000 acres of game refuges located in seventy-four of the eighty-eight counties of the state. These were obtained and are operated without expense to the taxpayers. They were established by the Division of Fish and Game of the Ohio Department of Agriculture under a system of leasing farms for game refuge purposes. The farms, usually grouped in a compact body, are leased by the state for ten-year periods at a yearly rental of $1 for each farm.

All shooting, trapping or other disturbance of wild life is prohibited in these refuges and since the lease is for game refuge purposes only and does not interfere with the operation of the farm in any way, farmers have been glad to lease their lands because of the protection afforded against trespassing. This work was begun in 1919 and now eighty-seven such refuges, ranging in size from 500 to 2800 acres, have been established, including about 700 farms in all. These refuges are thoroughly posted and actively patroled by sixty-five regular game wardens. Not only is the game protected herein, but additional breeding stock is introduced from the game farm so as to make these areas breeding centers for the surrounding unprotected territory.

Superficially, this seems an excellent plan and it would be interesting to know how it works out in detail.

LOUISIANA RICH IN FURBEARERS.

Endowed with exceptionally large areas and cover suitable for fur-bearing animals such as the mink, otter, raccoon, opossum, skunk and muskrat, Louisiana produces more pelts of fur-bearing animals than any other state in the Union, and exceeds in this regard, even combined, the pelt output of all of the provinces of the Dominion of Canada. While the variety of fur-bearing mammals here is not as great as that of the more northern states or in the various provinces of Canada, it is the abundance of the fur-producing species found in Louisiana that places her to the forefront.—*Bulletin No. 13, Dept. of Conservation, Louisiana.*

PROGRESS REPORTED IN WEST VIRGINIA.

The West Virginia Fish and Game Commission has now been in operation for four years. In a ninety-six page report recently issued, splendid progress is shown. Prosecutions have increased from 30 to 1144 and fines from $605 to $15,579. Two state forests comprising a total of 16,000 acres have been purchased. A game farm of 327 acres has been purchased and equipped. During the year, 841 pheasants were liberated and 3600 eggs distributed. Sixteen game refuges have been established and 2,000,000 fish planted. In order to give better protection to fish, 200 streams have been closed to fishing. Attention has also been given to pollution matters. Emphasis has been placed upon law enforcement and educational activities and the commission is now run on a budget system.

NEW MEXICO INCREASES REFUGE SYSTEM.

The outstanding achievement in the field of game conservation during the past two years in New Mexico has been the practical completion of the refuge system. In all, fifty-seven refuges have been established, forty-three of which are for big game and fourteen are bird reservations. Of this number, ten have been established during the past two years. The last biennial report of this state estimates the mountain sheep at 150 and the number of antelope at 711. A comprehensive survey of the wild life situation has been undertaken with a trained biologist in charge.

The present officers in charge are attempting to supplant "compliance by force with an educational campaign designed to stimulate an attitude favorable toward the laws and thus toward their voluntary observance."

KANSAS PLANS TO BUILD AND STOCK ARTIFICIAL LAKES.

Kansas recently passed a law which is proving very popular. It provides for the establishment of artificial lakes and makes liberal provision therefor. The plan includes the purchase of two to four lakes each year from the hunting and fishing license fees. Each lake must comprise at least 1000 acres and this is planted with suitable aquatic plants and grass, and is stocked with fish. Kansas has one of the largest hatcheries for warm water game fish and these new lakes will form a proper means of distributing the young game fish. Already 218 applications for such lakes have been

received. As a result of draining operations, it is probable that other states will be forced, in future years, to follow the example of Kansas.

AN ANTARCTIC SANCTUARY.

The French League for the Protection of Birds has awarded its silver medal to M. Etienne Peau, whose mission to the Kerguelen Islands has resulted in the establishment of a national antarctic sanctuary for the protection of many species of birds, including the penguins, which have been massacred wholesale for their skins and oil. The territory embraces Kerguelen Island, the Crozet Archipelago, the Islands of St. Paul and Amsterdam, and Adelie Land. The League is also encouraging the formation of lesser bird reserves in France itself by offering the Prix Magau d'Aubusson, 1926-27, for the creation of *Refuges d'Oiseaux*, provided with nesting-boxes, food-stands, watering-places, plantations, etc.—*Bird Notes and News, Vol. 12, No. 3.*

IN SANCTUARY.

That wild birds learn to know and recognize the fact of their safety in bird-sanctuaries is illustrated by one of the pleasant records of the Fallodon waterfowl sanctuary told in Viscount Grey's delightful new book, "Fallodon Papers." As is well known, the security of the ponds and rough land, planted with suitable trees and shrubs, which are enclosed as a breeding ground for British and foreign ducks in this celebrated sanctuary, attract many wild visitors, especially those which come over the place on migration and hear the familiar calls of the birds below. Some of these drop down and settle. Of one bird, Lord Grey relates that when he saw it some miles away from Fallodon it took fright at a distance of ninety yards and flew from his approach. When it regained the ponds it showed no fear and became quite tame, evidently knowing where sanctuary and safety existed. This may satisfy the fears of some persons that the tameness learned in a bird-reserve endangers the safety of the birds when outside its boundary.—*Bird Notes and News, Vol. 12, No. 3.*

NEW FEDERAL BIRD REFUGE CREATED IN COLUMBIA RIVER.

A new federal bird reservation, to be known as the Columbia River Bird Refuge, has been created by President Coolidge on two small islands in the Columbia River, at the mouth of the Walla Walla River, Washington, comprising together about eight and a quarter acres of land.

The Biological Survey of the United States Department of Agriculture, under whose jurisdiction the new refuge is placed, has found these rocky islets especially desirable as breeding grounds and safe retreats for wild fowl. From early in winter until the northward migration of wild fowl in the spring the islands have been for years the favorite day-time resting places for hundreds of wild ducks, specially mallards, and wild geese, as well as for gulls, blue herons, and other species in smaller numbers.

The new reservation is not easily accessible to man and already affords waterfowl fairly safe refuge, because the Washington state game law already protects all waterfowl on the Columbia River.

REPORTS.

STATEMENT OF EXPENDITURES FOR THE PERIOD JULY 1, 1926, TO SEPTEMBER 30, 1926, OF THE SEVENTY-EIGHTH FISCAL YEAR.

	Materials and supplies	Salaries and wages	Service and expense	Property and equipment	Total
Administration:					
Executive and legal	$18 00	$2,711 33	$198 35		$2,927 68
Clerical and office	250 59	4,650 00	485 60	$171 98	5,558 17
Rent			2,291 47		2,291 47
Telephone and telegraph			643 31		643 31
Postage			1,269 37		1,269 37
Freight, cartage and express			299 60		299 60
Printing	239 30				239 30
Automobiles	12 60		39 58		52 18
Tahoe camp grounds	103 29	566 67	30 88	39 02	739 86
Total administration	$623 78	$7,928 00	$5,258 16	$211 00	$14,020 94
Education and research:					
Director and assistants	$3 61	$1,875 00	$252 49	$20 00	$2,151 10
Publicity:					
Director of publicity		$968 00	$235 10		$1,203 10
State Fair exhibit	$258 67	415 50	1,568 16	$2 31	2,244 64
Total publicity	$258 67	$1,383 50	$1,803 26	$2 31	$3,447 74
Conservation and protection:					
(Patrol and law enforcement)—					
Chief and assistants		$2,299 98	$128 10	$5 48	$2,433 56
Clerical and office	$3 00	998 33	2 65		1,003 98
Rent			65 64		65 64
Captains and deputies	673 71	36,852 84	28,510 04	96 00	66,132 59
Patrol launches	314 77	575 00	245 75		1,135 52
Automobiles	154 12		59 51	514 05	727 68
(Protection)—					
Lion hunting		405 00	142 88		547 88
Lion bounties			1,070 00		1,070 00
Total conservation and protection	$1,145 60	$41,131 15	$30,224 57	$615 53	$73,116 85
Commercial fisheries:					
Chief and assistants	$6 97	$2,323 53	$522 24	$91 09	$2,943 83
Deputies	11 56	3,037 10	1,022 64	54 90	4,126 20
Laboratory research	111 22	7,560 83	533 87	171 76	8,377 68
Statistical		1,144 52	35 66	7 36	1,187 54
Patrol launches	590 10	255 00	96 30	59 30	1,000 70
Salmon tagging	1 60		867 19		868 79
Botulism			3,750 00		3,750 00
Total commercial fisheries	$721 45	$14,320 98	$6,827 90	$384 41	$22,254 74
Fish culture:					
Chief		$949 98	$24 75		$974 73
Clerical and office	$12 39	960 00	6 30		978 69
Special field investigation	30 53	1,695 00	417 00	$81 80	2,224 33
Hatcheries	16,240 91	21,120 73	2,146 04	658 22	40,165 90
Hatcheries, additions and betterments				29,234 69	29,234 69
Automobiles	1,043 03		171 70	1,286 50	2,501 23
Rent			19 00		19 00
Total fish culture	$17,326 86	$24,725 71	$2,784 79	$31,261 21	$76,098 57
Screens, ladders and pollution:					
Chief and assistants	$2 20	$2,205 00	$852 83	$190 36	$3,250 39
Game propagation:					
Game farm	$1,264 94	$1,935 00	$541 97	$127 25	$3,869 16
Additions and betterments				1,372 67	1,372 67
Total game propagation	$1,264 94	$1,935 00	$541 97	$1,499 92	$5,241 83
License commissions			$9,146 40		$9,146 40
Total expenditures	$21,347 11	$95,504 34	$57,692 37	$34,184 74	$208,728 56

STATEMENT OF INCOME FOR THE PERIOD JULY 1, 1926, TO SEPTEMBER 30, 1926.

	Detail	Total
License sales:		
Angling	$61,735 00	
Hunting	50,149 00	
Market fishermen's	18,400 00	
Trapping	379 00	
Wholesale fish packers' and shell fish dealers'	775 00	
Game breeders'	52 50	
Fish breeders'	35 00	
Total license sales		$131,525 50
Other income:		
Court fines	$11,855 78	
Fish packers' tax	3,526 97	
Fish tag sales	1,803 03	
Game tag sales	5 95	
Miscellaneous sales	10 00	
Abalone inspection	55 07	
Interest on bank deposits	599 98	
Total other income		17,856 78
Total income		$149,382 28

VIOLATIONS OF FISH AND GAME LAWS.

GAME CASES.

July-August-September, 1926.

	Number arrests	*Fines imposed*	*Jail sentences, days*
Violations of hunting license act	65	$1,240 00	20
Deer: closed season or district	23	1,085 00	
Deer: does; fawns; spiked bucks; forked horn bucks in district 1¾	50	2,900 00	300
Deer: overlimit	1	150 00	
Deer: failure to produce horns and hide	8	400 00	
Deer: evidence of sex removed from hide	3	125 00	
Deer meat: sale of	1	100 00	
Deer: running with dogs, closed season	2	50 00	
Ducks: closed season	10	375 00	
Mudhens: closed season	2	25 00	
Shorebirds	2	75 00	
Doves: closed season	22	660 00	
Doves: overlimit	6	175 00	
Grouse: closed season	1	50 00	
Sage hens: closed season	6	300 00	
Pheasants: closed season	1	100 00	
Quail: closed season	32	1,610 00	10
Non-game birds	17	600 00	120
Rabbits: cottontail-brush: closed season	49	1,350 00	30
Squirrels, tree: closed season	1	25 00	
Shooting game from automobile	3	225 00	
Trespass	2	65 00	
Night hunting	1	100 00	
Game refuges: hunting, possession of firearms	12	210 00	
Fur trapping regulations	2	35 00	
Totals	322	$12,030 00	480

FISH CASES.

July-August-September, 1926.

	Number arrests	Fines imposed	Jail sentences, days
Violations of Angling License Act	11	$150 00	180
Violations of Commercial Fishing License Act	7	80 00	
Trout: closed season or district	2	100 00	
Trout: buy or sell	4	120 00	
Trout: overlimit	14	550 00	
Trout: taken other than with hook and line	2	50 00	
Striped bass: undersized, overlimit	30	710 00	150
Striped bass: sale, closed season	2	50 00	
Crabs: transportation from district 1½	3	300 00	75
Crabs: meat not in shell, undersized	2	45 00	
Crabs: closed season	1	20 00	
Clams: overlimit, undersized	18	805 00	40
Abalones: undersized, dried	31	845 00	
Lobsters: closed season	10	325 00	
Spot fin croaker: offering for sale	1	25 00	
Barracuda: undersized	5	105 00	
Black bass: undersized, sale	3	95 00	
Sunfish: overlimit	1	25 00	
Illegal fishing: 300 feet of inlet to lake, 250 feet of lower side of dam	3	30 00	
Illegal night fishing	1	25 00	
Nets: illegal possession or use	13	1,225 00	50
Totals	164	$5,680 00	495

Seizures of Fish and Game.

July-August-September, 1926.

Ducks	6	Black bass	20
Doves	243	Sunfish	84
Mudhens	1	Catfish	1
Shore birds	4	Salmon, pounds	750
Quail	35	Barracuda, pounds	1002
Sage hens	31	Spotfin croaker, pounds	125
Non-game birds	30	Pismo clams	686
Deer meat, pounds	3174	Crabs	693
Doe hides	1	Crab meat, out of shell, pounds	360
Buck heads	1	Shrimp meat, pounds	10
Spike buck, hide and antlers	1	Abalones	23
Rabbits	59	Split tails	2
Squirrels	4	Lobsters, pounds	150
Trout	284	Nets	12
Striped bass, pounds	686		

CORRECTION CALIFORNIA FRESH FISHERY PRODUCTS REPORTS.

April, May and June, 1926.

In the October, 1926, issue of California Fish and Game, California Fishery Products Report for the months of April, May and June should be corrected to read as follows:

Mendocino, Sonoma and Lake counties: Cultus Cod, 3563 lbs., Sandabs, 7150 lbs., Sole, 67,840 lbs., Total, 290,161 lbs.

Marin County: Smelt, 11,655 lbs., Turbot, 995 lbs., Total, 382,902 lbs.

Solano and Yolo counties: Salmon, 34,469 lbs., Shad, Buck, 37,157 lbs., Shad, Roe, 40,086 lbs., Striped Bass, 8042 lbs., Total, 122,903 lbs.

Sacramento and San Joaquin counties: Salmon, 145,216 lbs., Shad, Buck, 21,121 lbs., Shad, Roe, 20,642 lbs., Striped Bass, 49,736 lbs., Total, 259,661 lbs.

San Francisco and San Mateo counties: Smelt, 23,866 lbs., Mussels, 3145 lbs., Total 3,429,399 lbs.

CALIFORNIA FRESH FISHERY PRODUCTS FOR MONTHS OF JULY, AUGUST AND SEPTEMBER, 1926

Compiled by Fish and Game Commission, Department of Commercial Fisheries.

Species of Fish	Del Norte Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Sacramento, San Joaquin	Alameda, Contra Costa	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego, Imperial	Total	Mexican, brought into California via Los Angeles	Mexican, brought into California via San Diego	Total Mexican brought into California
Albacore									1,728		1,521,205	556	417,214	1,940,703			
Anchovies							3,400		63,184		2,975			69,559			
Barracuda								17,524	5,487	37,887	349,263	3,261	475,952	889,374	181,864	170,496	352,360
Bonito								15,029	30,606	13,784	2,094,876	1,642	197,323	2,353,260	5,487	8,352	13,839
Carp				92	126	537				4,200				4,955			
Catfish		938		1,555	17,773	10,427								30,693			
Cultus Cod	21,000	6,309					124,583	27,341	11,421	130				190,784			
Flounders	300			93			132,147	87,200			902			220,642			
Grayfish							8,595	3,800			11,668	12	90,673	114,748			
Hake							10,535	9,500						20,035			
Halibut	108,186	14,033					82,055	2,938	8,174	64,711	57,857	680	9,270	347,904	11,162	235,194	246,356
Kingfish							23,173	4,235	14,733		32,543		343	75,027			
Mackerel							166	55,575	170,060	7,314	318,794	28,613	37,253	617,775		744	744
Marlin, Mackerel, Horse									24,827		67,511			92,338	2,320		2,320
Mullett												495	3,038	3,533			
Perch	5,909	200	8,420				21,381	5,692	2,194		11,249	90	1,778	56,913			
Pike					11	51								62			
Pompano									81		38			119			
Rock Bass										597	130,917	16,530	72,176	220,220		436	436
Rockfish	27,414	1,116					232,789	162,442	299,797	30,869	343,621	2,338	189,889	1,290,275			
Sablefish	20,718						600	2,850		8	206			24,382			
Salmon	1,502,198	793,207		186,009	231,799	384,519	899,684	2,489	287					4,000,192			
Sandabs							154,439	83,220	41		1,572	76		239,348			
Sardines			150				1,737,735		37,559,123		344,515	528	390,596	40,032,647			
Sculpin										7	26,958	35	1,186	28,186			
Sea Bass—Black										725	7,516	1,396	28,790	38,427	988	43,736	44,724
Sea Bass—White		125	38,341			282	34,689	182,423	101,197	53,968	581,889	1,161	127,171	1,121,246	15,982	180,313	196,295
Shad						1,809	25							1,834			
Sheepshead											20,953		4,355	25,308		1,245	1,245
Skates							20,288	16,400			1,289			37,977			
Skipjack	5,277							41,449	816		8,646,527	117	3,948,223	12,642,409	442,530	1,011,957	1,454,487
Smelt	1,440	97	5,642			149	26,560	61,080	58,952	1,742	59,050	43,650	5,828	264,190	557	100	657
Sole							969,674	1,010,140	56,248	17,240	3,934		25	2,057,261			
Splittail						565								565			
Striped Bass				3,413	2,619	68,479	36,992		70					111,603			

Swordfish												7,461	165	15,744	23,370		1,000	1,000
Tomcod							50								50			
Tuna												15,928			15,928			
Tuna—Bluefin												4,046,320		13,439	4,059,759			
Tuna—Yellowfin												1,299,028	2,924	1,001,273	2,303,225	642,464	1,743,005	2,385,469
Turbot			140												140			
Whitebait	38,390						4,747		288						43,425			
Whitefish											4,720	42,531		2,293	49,544		432	432
Yellowtail											2,740	572,946	474	978,126	1,554,286	55,590	207,970	263,560
Miscellaneous	129						2,289	5,768	11,032	5,053	30,934		238		55,443			
Total fish	1,730,961	816,025	52,693	191,192	252,328	466,818	4,526,596	1,797,095	38,420,346	245,695	20,652,976		104,981	8,011,958	77,269,664	1,358,944	3,604,980	4,963,924
Crustaceans:																		
Crabs	[1]17,376						[2]228,000		[3]120						[4]245,496			
Shrimps			325,477			1,200	100,407								427,084			
Mollusks:																		
Abalones									912,750	3,522					916,272			
Clams—Cockle		457	1,940												2,397			
Clams—Mixed	1,881	334	1,275									150			3,640			
Clams—Pismo										81,861					81,861			
Clams—Softshell		885	27,360			25,038	10,276								63,559			
Cuttlefish							1,056	75	12,597						13,728			
Mussels			35				2,671		750	632	75				4,163			
Oysters—Eastern			[5]6,538				[6]93,890								[7]100,428			
Squid									5,878						5,878			
Totals	1,750,218	817,701	415,318	191,192	252,328	493,056	4,962,896	1,797,170	39,352,441	331,710	20,653,201		104,981	8,011,958	79,134,170	1,358,944	3,604,980	4,963,924

All amounts shown in pounds unless otherwise specified. Albacore and skipjack cleaned.

[1] 724 dozen. [2] 29,721 shell oysters. [3] 9,500 dozen. [4] 426,773 shell oysters. [5] 5 dozen. [6] 10,229 dozen. [7] 456,494 shell oysters.

49000 2-27 7500

CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

Volume 13 SACRAMENTO, APRIL, 1927 Number 2

CONTENTS.

		Page
GAME BIRD FARMING	*August Bade*	77
WE MUST PRODUCE IF WE DESTROY	*Gene M. Simpson*	92
DOLLAR-A-YEAR WARDENS	*Walter R. Welch*	96
BELIEVE IT OR NOT	*August Bade*	98
GAME PROPAGATION	*August Bade*	99
SECOND ANNUAL CONVENTION EMPLOYEES OF THE CALIFORNIA FISH AND GAME COMMISSION	*Rodney S. Ellsworth*	102
THE DEPARTMENT OF COMMERCIAL FISHERIES	*N. B. Scofield*	107
THE VIEWPOINT OF AN ONLOOKER	*Charles Dunwoody*	110
EDITORIALS		113
FACTS OF CURRENT INTEREST		135
COMMISSION ACTIVITIES		136
COMMERCIAL FISHERY NOTES		141
LIFE HISTORY NOTES		146
GAME PROPAGATION IN OTHER STATES		149
REPORTS—		
Violations of Fish and Game Laws		157
Statement of Expenditures		159
Fishery Products, October to December, 1926		160

GAME BIRD FARMING.

By AUGUST BADE, Superintendent California State Game Farm.

During the past few years volumes have been written, many conventions held, countless speeches made, and much legislation enacted to save our fast vanishing resources of wild life. On the other hand, with the exception of a few isolated cases, very little has been said or

done toward propagating, in a domestic way, any of the game birds or animals.

When one of our most outstanding exponents of the great game of football was asked what he considered the best defense, he unhesitatingly replied, "A strong offense. If you can keep possession of the ball, you can win." So I believe it is with our game birds. Artificial propagation is the answer: merely helping nature with her work, but in a scientific and businesslike way.

The sole object of the following pages is to set forth, in a clear and concise manner, the more important facts concerning the propagation of game birds, as they have come to us through years of patient work. Experience is not only the best teacher, but the lessons thus learned are far more apt to remain with us and prevent the recurrence of previous mistakes. These lines are to lend encouragement to those

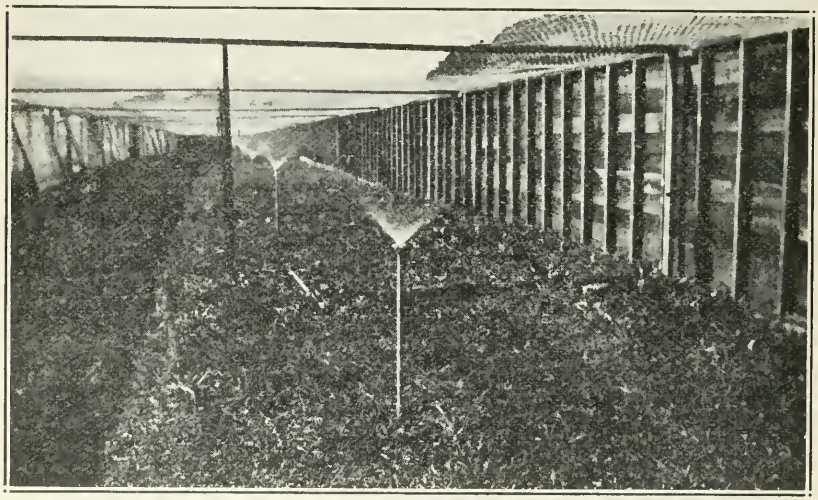


FIG. 16. A section of breeding pens with the partitions removed and the sprinkling system working. These pens have been prepared for breeding purposes and the partitions will be replaced again forming the twenty-four foot square pens.

who may have it in mind, possibly for the first time, to try their skill at the most fascinating game of them all—game bird farming.

If we are to leave any inheritance for the generations to come, and if they are to enjoy in a limited way the pleasure that has been ours in a very large sense, it behooves us to put our very best energies and resources into this most important work of artificial propagation.

Game farming is not a new idea. We have had game farms for many years. But in the past ten years, in keeping with other lines of industry, marked progress has been made. With the expansion of industries along the lines of quantity production, the small game farmer has seen his plant grow and the production increased almost beyond his fondest expectations. In these past few years, many states have willingly taken the output of the private breeders for stocking purposes. Many private clubs have also been in the market.

During the last twenty years, the state of Oregon has seen its department of game bird farming grow into a well organized scheme, consisting now of three farms, and all from the beginning of a private farm which the state purchased from Gene M. Simpson.

The state of Washington started with one small farm, operated in connection with the penitentiary at Walla Walla, and its first lot of eggs and birds came from the same farm from which Oregon started. Now Washington has two state farms and about fifteen county farms. The results have more than justified the effort, and the expansion has been far beyond the expectations of those who had to do with the original idea.

In establishing a game farm, either on a large or a small scale, there are certain vital conditions to be considered if you expect to be successful and get the returns on your investment of money and labor which you have a right to expect. Before a site is finally selected, carefully consider the following facts: character of soil during the entire year, drainage, and the water supply.

Most authorities will tell you to select a site with a southern slope. This is very well in a country where the seasons are marked by a wide range in variations of temperature. But if you are located in a warm section with little or no variations of climate, it is not so important. Sand or gravel soil must be had and the slope or grade of the ground should be about two feet in the hundred. Under no circumstances select a location on black or gumbo soil. Many failures are traced to this very reason.

Sandy soil usually drains well and lends itself well to cultivation and the growing of cover crops with a little water. It is also much easier to keep clean and sweet, a condition that is very desirable in bird raising.

In their wild state, game birds are as clean as it is possible for anything to be. They seldom stop twice in the same place for the night, but always have a clean room. When you confine them in a pen or run, these facts must be given consideration. That is why drainage and the kind of soil upon which your pens are built play such an important part in your scheme.

Then if you have carefully observed these birds, you will have noticed this fact: they will always insist on clean water. You usually find them near some cool spring or other source of water supply. You will do well to provide them with the same kind of water that you, yourself, enjoy. Public health authorities are continually telling us to be careful about the kind of water we drink. It is the source of many diseases of birds as well as humans.

If all of these facts are known and proper consideration is given them in the selection of a site for bird pens, many of the troubles you read about in game bird publications will mean very little to you. It is very much easier to prevent than it is to cure, and this old adage is doubly true and should be stated in far more drastic terms for the game bird farmer.

In getting the water to your pens a pipe line is superior to any other plan. The pipes should be laid in the ground, so the water will be cool, with risers in each pen. Three-quarter-inch pipe, with half-inch

risers, if there is very much pressure on the line, is sufficient for most purposes.

In a climate such as we have in California, a sprinkling system is well worth while, provided you have sufficient pressure on your water line to run the necessary number of sprinklers. If your pens are arranged according to the diagram that will be given later, one sprinkler head will do for two pens. This plan helps to cut down the expense of your water system and at the same time is found very efficient in practical experience.

In many sections of the country where the natural moisture in the form of rain is distributed over the entire season, an irrigation system is not so important. But in the dry areas where there is a lack of moisture over a period of several months, and the vegetation dries up, it is quite necessary to have a water system.

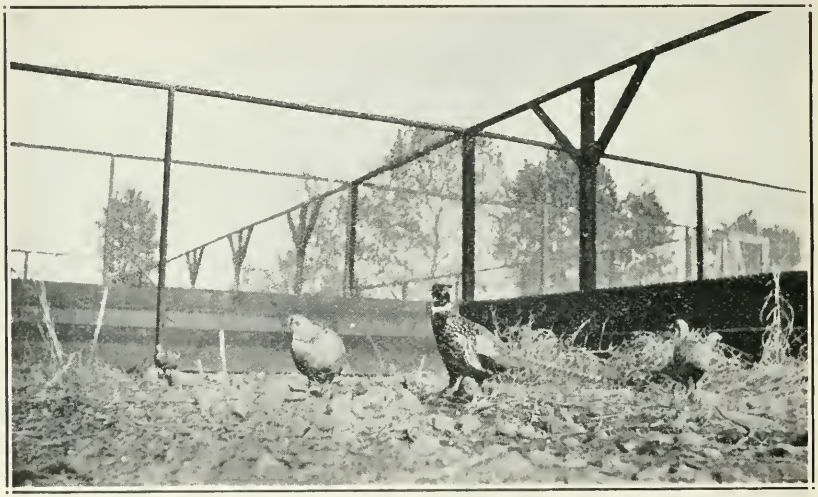


FIG. 17. A typical breeding pen of pheasants, one male to five hens. During the breeding season the male pheasant develops ear puffs that resemble horns.

The arid sections have many advantages in a climatic way that make them desirable as locations for bird farms, provided some sort of water system can be installed. A well and an electric pump have been known to give excellent results at a very low cost. Most farms have water supply under pressure so the task of hooking up a few bird pens is a small one.

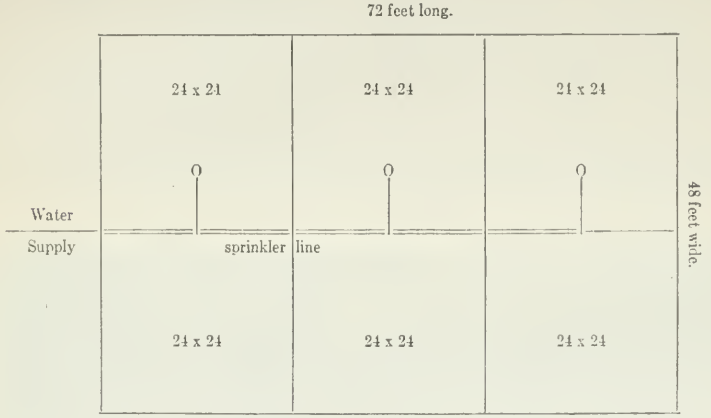
The sprinkler head that has been found to give the best results is one commonly used on lawns and is called the "Thompson." It has no revolving parts to wear out and throws the water with a fine spread. This flow of water can, of course, be regulated at the turn-on valve.

Both drinking and irrigation water can be supplied by one pipe line. Merely set your sprinklers on a level, and by opening the valve just a little the water will trickle enough for the birds to get a drink. By opening the valve wide the sprinklers will operate at full force.

Having the site and the water problem settled, the next thing is the size and kind of pens. In nine out of ten cases, the amateur makes his pens too small. This is a practice that leads to many troubles. Here

is the golden rule in bird raising. Allow each bird 64 square feet of pen room. A very convenient pen to build and one that will answer a number of uses is made 24 feet square.

Below is offered a sketch of six pens that most any one can build and in which the birds will be easily handled.



The easiest way to construct this enclosure is to first put up the frame work of 2 x 4, making the studs or posts 7 feet high. This gives you the height of the pens. Then run a baseboard 2 feet high around the entire structure, leaving a space of 3 feet for a gate in each pen. Use 1-inch mesh wire on the sidewalls and partitions and if you want to use the pens for quail, put 1-inch mesh on the top as well. If only pheasants are raised, 2-inch wire may be used on the top. Studs should be placed 8 feet apart. The removal partitions are made in two sections for convenience in handling. The partition along which the water line runs is made permanent. The risers for the sprinklers are 3 feet high. With this arrangement of removable partitions you may have a pen 24 x 24, or by removing one set of partitions you can increase the size of the pen to 24 x 48, or even make it 24 x 72. This type of construction also has the advantage of permitting the ground to be plowed with a team and cultivated as any other ground on the farm is handled.

Gates are 3 by 6 feet and made with 1 x 4 and 1 x 8. The bottom of the gate is boarded solid the same height as the baseboard of the pen. Six-inch light strap hinges are heavy enough to carry the gates. One-inch mesh wire is used on the gate and is the same width as the sidewalls.

Now that we have the pens, the next consideration is the kind of cover crop to grow. If you are using the pens for breeding stock, greens, such as kale and rape, should be growing in the pens. The best place for these is in the area covered by the sprinkler so they will have plenty of moisture. The other half of the pen which will be dry or semidry can be planted to buckwheat or oats. It is best to drill this seed in rows about ten inches apart.

In their wild state, birds go to shade and cover as they desire and when confined in a pen it is well to take this fact into consideration. If you can make them comfortable by giving them surroundings as

near to their natural state as it is possible to make them, you will experience very little trouble and your birds will be in a healthy condition at all times.

With this sprinkling system you will be able to create in your pens the exact conditions that birds like in their wild state. When they seek cover in the middle of the day it is usually in some moist, cool place. There they rest in perfect ease and contentment.

If you are preparing your pens for the rearing of young birds you will find that if part of the pen is seeded to alfalfa in the fall, it will afford excellent cover the following season. Also seed part of the ground to rape and a few plants of kale transplanted as additional green stuff. Clover also makes fine cover for young birds. An equalization of sunlight and shade is the goal to be aimed at in all bird pens.

Fig. 18. Methods of cultivating bird pens. The ground is worked just the same as any other part of a farm is cultivated. Removable partitions make this possible.

There are two ways in which you may get your start in birds. One is to get the adult birds for breeding stock and the other is to get eggs from which to hatch the birds. In either case be sure to patronize a reliable breeder so your foundation stock will be of the best.

Quail and Hungarian partridges breed in pairs but the ring-neck and Mongolian pheasants are polygamous and are best bred in the ratio of five hens to one male bird. Pheasant hens will average fifty eggs each for the season beginning about March 10th and ending July 1st. There is little to choose between the ring-neck and the Mongolian as game birds. The Mongolian is the larger of the two.

If you are starting with adult birds, you will want to know what to feed them. Egg production in wild birds, like domestic fowls, depends a lot on feed. Spratt's Pheasant Meal Number 5 is one of the important items. Precooked wheat flakes is another. Mix the two in equal

proportions and dust in a little egg maker of some good commercial brand. Give this combination of feed to your birds in the evening, and for morning feed let them have some good scratch feed that carries a good proportion of wheat with very little cracked corn in it. A good scratch food for pheasants is made with wheat or cracked wheat, oat groats, millet seed and just a little cracked corn. Adult birds are only fed twice a day. Gather the eggs as often as possible and under no circumstances leave the eggs laying around in the pen. You will in a short time know when to expect the most of the eggs to be laid and can be looking for them.

Whether you have your own breeding stock or buy the eggs, the hatching program is the same. Eggs should be set when they are not over three or four days old and have been kept in a cool place and turned at least once a day in the meantime. If you receive the eggs

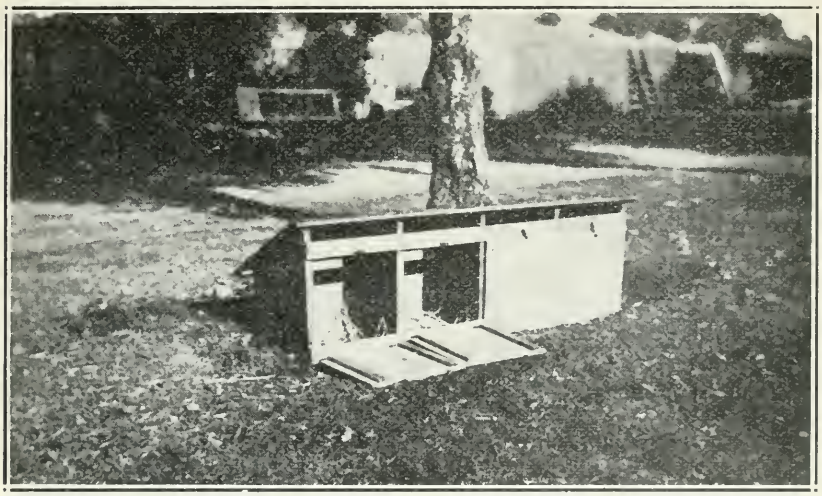


FIG. 19. A setting box containing four nests. Two are open and two are closed. While the hen is on the nest the doors are kept closed. She is let off the nest once a day for food and water.

from a distance of a thousand miles or more, let them set in a cool place twenty-four hours before putting them under the hen.

A small hen of either the Rhode Island or Buff Orpington breeds is the best. If possible, get a hen that weighs not more than three pounds. Bantams and their crosses with the buffs and reds make fine mothers.

In making the nest be sure and get it deep enough so the eggs will be below the general surface of the ground. This will insure better moisture and a better hatch. The above cut shows a good way to set pheasant eggs. This device will give absolute control of the hens.

Much of your success in rearing game birds of any kind, will depend on the care of the setting hen. First of all, she must be clean of any body lice. This can best be accomplished by the use of sodium fluoride as a dusting powder. Dust the hen before she is set and again on the seventh and fourteenth days. If she has "scaly leg" do not set her under any circumstances. The infection will be picked up by the young birds. Let her off the nest each morning at the same hour for

food and water. Twenty minutes is long enough. See that she goes back to her nest and then close the door.

Pheasant eggs will hatch in twenty-three days under a normal hen, but in calculating the time do not take into consideration the first day the hen is set. If you count this day it may require twenty-four days. Hens are usually set in the evening and the time should commence the next morning. If hatching is done on a large scale, the incubator may be used to good advantage. When the hens are set, start an incubator at the same time and they will hatch together. The incubated chicks can be given to the hens for brooding along with the ones they have hatched and become one family. But do not, under any circumstances, try to give a hen birds of different ages or birds of different varieties. They will almost invariably kill them.

In handling incubated chicks with the domestic hen, it is a very good plan to take the number of chicks you want to give to each hen and place them under her before you remove the hen and the chicks she has hatched from the nest. Leave them there for an hour or so before placing them in the field coop. I would not advise the use of the incubator unless you are hatching on a scale where you would be using at least several hundred hens during the season. Another use has been found for the incubator, by which many birds may be saved from being killed in the nest by the heavy hens that are sometimes used. Just as the eggs begin to pip, remove all but two or three from the hen and place them in the incubator, which has previously been tested for the proper degree of heat. Here is another point about the use of the incubator that must be watched to avoid bad results. The bulb of the thermometer should be on a level with the center of the eggs and not an inch or more above them. Here is a case where a very little distance makes a very great change in the degree of heat. It is the little things that sometimes cause the most trouble and trouble in the bird game means less birds.

After the birds are dry and begin to come out from under the hen, they are ready to be removed to the field coop. If it is a cool day, it is better to have a warm cloth or hot water bottle in the bottom of the basket, or bucket, in taking the birds from the nest to the field coop. Great care should be exercised to see that the little fellows are not chilled. At this particular time they are delicate and a chill may mean the end of them.

The field coop should be prepared in advance for the reception of the birds and the hen by covering the bottom with some clean, dry sand. Bank up the coop so that it will be warm and no draught of cold air allowed to pass under it. Also take another look for any small holes through which the little birds may make their escape. The first twenty-four or thirty-six hours is the most critical time in the life of the bird. He has come into this world under a peculiar condition. He does not understand the language of his foster mother, and she is not the right color nor the proper size, so taking all in all, he is bewildered and will run away if there is any possible chance.

With the birds snugly in the warm basket and the hen under your arm, proceed to the field coop. Place the birds in one corner of the coop and set the hen very close to them holding your hand against her breast so she will not, in her eagerness to care for them, step on the little fellows. With the other hand gently shove the birds under the hen

and, when she finally finds that she has her family again, she will settle down to the business of brooding them. In half an hour visit the coop and quietly peek in to see if all is well. If it is, go away and leave her to herself and the birds. This is the time she has been looking forward to and will do much better if left alone.

The brooding period usually requires twenty-four hours and can be tested by the action of the birds. When they are through brooding they will begin to look around for food and now is the time for the first feed. To your surprise you will probably find that in the short time they have been with the hen, they have accomplished a great deal. They have not only adopted the hen as their mother, but have learned her cluck and warning call as well. The family government has been established.

The following cut shows the kind of field coop and run that is much used by pheasant men.

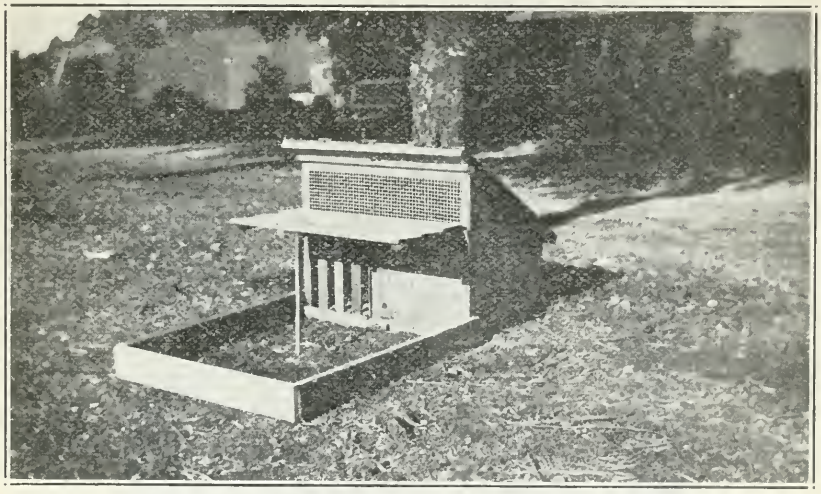


FIG. 20. The field coop in which the hen is confined for the first three weeks. The run in front of the coop is one foot high and holds the birds in close touch with the hen for the first few days. About the fourth day the little fellows jump over the run and then it is time to remove it. Notice the ventilating space in front of coop. Plenty of fresh air is desirable.

Having successfully hatched the eggs, the real work of the pheasant man begins. The little fellows must be fed. There are a number of different methods of feeding, and as feeding is very essential, it is well that we go into the subject quite thoroughly.

Generally speaking, there are two systems, known among pheasant men as the "wet" and "dry" methods. Both have merit and strong points but rather than try and pick out the best points of each and try and combine them into one, we will discuss the most generally used system and the one that has been used in this western country with success.

There is one thing that is well to remember in attempting to raise any wild bird or animal, and that is to find out what is its natural food. If you can duplicate that food, you will have little trouble.

The success and advancement of the game bird farming idea in the past few years has been greatly helped by the better understanding

of the kinds of foods that particular birds thrive and develop best upon. The birds we are mostly concerned with are the Chinese pheasants, Hungarian partridges, and the different kinds of quail.

We now know that these birds are insectivorous in every sense of the word. By that we mean their food in their natural habitat consists of bugs, worms and insects of many kinds, plus a reasonable amount of greens. These facts have been learned from a series of experiments carried on over a long period of time and the examination of the crops of many birds taken at various seasons of the year from widely

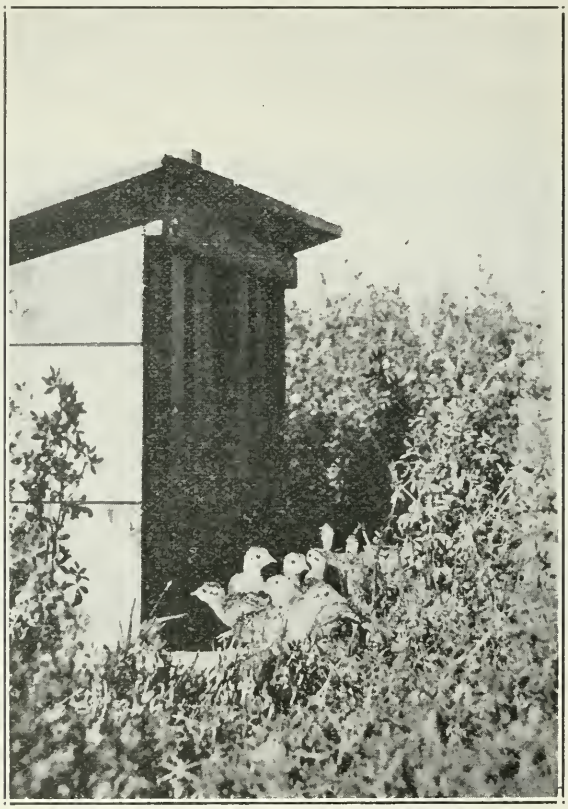


Fig. 21. A brood of young pheasants at feeding time. The run has been removed but the coop is their home. The front is slatted so the little birds can come and go as they please, but the foster mother remains inside the coop for two weeks. After that she may be let out in the pen with the birds.

separated sections of the country. Much of this work has been done by the U. S. Biological Survey and the different agricultural colleges.

To give a concrete example: a man complained that pheasants were eating his grain. A hen was shot in the middle of a thousand acre field where wheat was abundant. Its crop showed not one single kernel of grain. But on the other hand, the crop did tell the story of how the pheasant had been busy with cutworms, wireworms, grasshoppers and several kinds of wild seeds all of which are harmful.

Here is another fact that experience has taught pheasant men: game birds are about the cleanest things we know anything about. Seldom do they stop over night in the same place. They have a clean bed every night. What is the deduction? We can not be too clean either, in the matter of food or pens in handling game birds.

Before we bring forth any set kind of menu let us discuss fully a number of different foods and their relative values in the scheme of bird raising.

GREENS.

Any one who has observed closely the young bird during the first few days of his life will have noticed how he begins very early to pick at the green blades of grass and the clover leaves, if there are any. By an elimination process, lettuce has been found to be the one green food that most all birds like, and it is about the easiest of all greens to produce. Spinach, rape and kale are also good and rate about in the order named.

During the first twenty-four hours of the young bird's life, nature provides the nourishment from the yolk of the egg from which the bird was hatched. Thus it would seem that eggs could be used to advantage as a part of the ration. It is only going on with the work nature has begun.

BOILED EGGS OR CUSTARD.

Eggs may be used in two ways: either in the ordinary way of "hard-boiled" or made into egg custard. If you are good at making custard, I would advise its use because of the added value of the milk it contains. If you use the custard, do not season it in any way, and have it quite dry but not burned. It may be run through a fine sieve of fly screen after it has become well cooled and is ready for use.

If you use the boiled egg, see that they are well boiled and have ample time for cooling before feeding time. It is well to boil eggs the day before you want to use them. If dropped into cool water when they are first taken from the boiling water the shells will come off much easier. Then they should be run through the sieve the same as the custard.

MILK AS A BIRD FOOD.

Physicians and public health people have for a long time been urging us to use more milk as a part of our daily food ration. Here I want to recommend the same thing for birds. The form in which it is best adapted to bird life is what you have always known as cottage cheese. Make it in the ordinary way, with no seasoning or coloring matter in it, but have it just a little drier than for table use. Run it through the same sieve you used for the egg and custard.

The best ducks I ever raised grew up on a ration of old-fashioned bread and milk with some fine building sand sprinkled over it. Slice the bread about as you would for the table and place two slices in an ordinary pie tin. Pour the milk over it until it is well covered. (You known ducks like their food moist.) If you have a little of Spratt's Pheasant Meal Number 12 to add to the mixture, it will not be objectionable to the ducks.

Now we said that pheasants, Hungarians, and quail were insect-eating birds. How shall we provide this part of the menu? In years past, and with some of the older men of today, "bugs" are still manufactured for this very purpose. The blue fly was put to work,

and what is commonly known as "maggots" were produced. In many ways this work is objectionable and is quite expensive when large numbers are required. If the bugs are not thoroughly cleaned before being fed to the birds, bad results may be the reward.

But some one discovered that fresh liver, either beef or hog, was a fine substitute for the manufactured bug. It at least has this advantage, that it is usually government inspected and is clean. Here is about the most satisfactory way in which to use it.

BOILED LIVER.

From a packing house or your butcher procure some fresh liver. With a sharp knife, cut it into strips of about the same size so it will cook evenly, and boil it in the same way as you would any piece of meat until it is well done. Let it cool and then run it through an ordinary food chopper, making the pieces very small. If you can not get them small enough with the chopper resort to the sieve you used with the eggs. When the birds are not more than a week old the bits must be quite small or they will not be able to swallow them.

SPRATT'S PHEASANT MEAL.

Spratt's Patent Limited for more than fifty years has made foods for all kinds of animals and birds, and their product is quite essential to any well-regulated bird farm. Their pheasant meal is made in three sizes for convenience in feeding birds at different stages in their development. The smaller size, or number 12, is for young birds; the next size or number 5, for half grown; and then there is the number 3 for adult birds. This food may be purchased at their San Francisco store at 1186 Howard street, in any quantity you may want. The directions for preparing this meal will be given on a later page. It is mentioned here because of its worth as it fits into the scheme of a well balanced ration.

In bird farming the well balanced ration is being given just as much consideration as the household economist is taking in the matter of a well regulated menu for the table. Too much of any one food is to be avoided and more particularly those foods that are the richest and at first may appear to be the most nourishing. A well balanced ration for birds consists of foods that will produce muscle, bone, flesh and feathers in an even and methodical manner.

No doubt you have seen young, domestic fowls of the common varieties, that were quite large in their body development, but had no feathers. I have seen game birds in the same condition. It was a plain case of a ration that was not as it should be. It was not balanced. In this very highly developed stage of the poultry business, one finds all kinds of foods guaranteed to produce the results desired. And there is no question but many of them have merit if fed in the way the manufacturer has stipulated.

VALUE OF COOKED FOODS.

Possibly you have already noticed that all of the foods so far mentioned, with the exception of the greens, are cooked. My experience has led me to believe that game birds or all insectivorous birds should be fed on cooked foods until they are close to maturity. Some will take exception to this but I am merely giving it to you as my experience. The digestive processes of these birds are not as strong as domestic fowls and anything you can do towards making the food a

little more digestible, will give the bird that much more energy to be used in putting on flesh, building muscles, and growing feathers. After the birds are eight or nine weeks old and at the age when many authorities will tell you to begin the use of scratch feed, I have always made it a practice to scald their feed so the fibre of the grains will be broken to some extent at least. Many people are using the uncooked feeds because it is much easier. There is no royal road to success in the bird game, but just a lot of real work. If the business is worth doing at all, it should be done well, and no pains spared in getting at the real bottom of things.

This calls to my mind an experience that happened a few years ago. The department sent me a man nearly sixty years old who was to work through the bird season, in order to gain enough experience so he could handle one of the many county farms in that state. The man had been a fishculturist most of his life. He was given about one hundred birds to feed as a starter. After a week or so he said they ought to have scratch feed and he began giving it to them. He was there for experience so I thought it best to let him get it. At the end of two weeks he had only thirteen of the birds left. That ended the uncooked food program so far as he was concerned.

PRECOOKED WHEAT FLAKES.

These wheat flakes are the same that you have been accustomed to use as a breakfast food, and may be had from any manufacturer of breakfast cereals. In feeding matured birds, the wheat flakes are usually mixed with the Spratt's Pheasant Meal; but a better way to give them to young birds is to place a dish of the flakes, in the dry state, near the coop so the birds may eat as they feel like it. At first it is a good idea to rub the flakes in the hand so the particles will be well broken up into such small particles that the birds will have no difficulty eating them. A dish of these wheat flakes can be kept constantly before the birds until they are full grown. It is a good food and can be recommended. The dish should be sheltered so that in case of rain they will be kept dry. As the birds near maturity, you may be surprised at the amount of this food they will consume.

Now that we have discussed the different foods that have proven valuable in the raising of birds, the next thing is to get the combinations that will give the bird a complete and well-balanced ration.

In this matter you will be guided to some extent by the local conditions and the experience you have had with birds. It is very hard to make a hard and fast rule that will be exactly right all the time. But we can outline the schedule and give data that will apply in the majority of cases. In this business you will be required to use your best judgment many times and employ about all the ingenuity you possess.

After the young birds have quit brooding and begin to explore the coop, it is time for the first feed. This will consist of finely grated, hard-boiled egg, or egg custard grated, and finely chopped lettuce. About one teaspoonful will be sufficient for a brood of a dozen birds. Give the hen some whole corn and a drink of water, but keep the water away from the little birds for the first two or three days. After that they may be given a drink in a shallow pan, but do not leave the pan near the coop so that they will be walking in it. This watering dish

must be kept clean at all times. A thorough scalding one or two times a week will help in keeping it clean.

If you will use a smooth board about one foot square for a feeding place, you will find it has several advantages. Place it just far enough in front of the coop so that the hen can not reach all the feed, only a portion of it, and she will quickly teach the little fellows how to eat this domestic food. But if you get the board too close, the food may disappear and lead you to believe the little birds ate it all.

This board will not only help you to keep the food clean, but it will help you to check up on the amount the birds eat. If the birds are eating as they should, all the food should be off the board in thirty minutes after it is placed there. It is not advisable to leave any uneaten food around the coop to sour and cause trouble.

Young birds must be fed four times a day for the first two weeks at least. Not too much at a time, but oftener, is the safest rule. If you start at 6 o'clock in the morning, and that is a very good hour, make the next feeding time at 10, then at 2 and then 5:30 in the afternoon. Here is a most valuable hint: when you have decided on the feeding hours, don't change them. Always be on time for the birds will be expecting you at that time. If you disappoint them, and persist in irregular hours, you will be the next to be disappointed.

About the second day begin to mix in some of the Pheasant Meal Number 12 in all four feeds. Make the pheasant meal half and half with the egg. At this time you may add some of the cooked liver to one of the day's feed, and it does not matter much which one it is, but make it only about 10 per cent. This is also a good time to begin the use of cottage cheese.

The ration now consists of the following ingredients: greens, pheasant meal, cooked liver, boiled egg or custard, and cottage cheese. A careful survey of these foods will convince the most skeptical of their nourishing qualities. They contain the essentials for full and rapid development of bird life.

The following scale of proportions will give a fair idea of the amount of each ingredient to be used in mixing the feed; egg or custard, 15 per cent; pheasant meal, 25 per cent; cooked liver, 10 per cent; cheese, 30 per cent; and lettuce, 20 per cent.

Spratt's Pheasant Meal is prepared by being softened with hot water, hot broth, or milk. As a general statement, it will take a quart of liquid for each quart of meal. Do not pour the liquid over the meal at one time, but stir and pour at the same time so each particle of the meal has a chance to receive its portion of moisture. You will at once notice the expansion that takes place in the particles of meal. After a little practice you will have no difficulty in getting just the right proportion, so it will be easy to get the meal ready. After it has been moistened, let it stand at least two hours before using and in the meantime give it an occasional stir. The meal that you intend for use in the morning feed can be softened the night before. There is danger of this meal becoming sour if it is moistened too far ahead of the feeding hour, unless it is kept in a very cool place. But you can nearly always detect any sour feed by the odor. Of course, it should not be used if sour.

If you try to mix all these different items together there is danger of getting your feed too damp, so it is better to have the lettuce in a separate pail as it contains a great deal of moisture. The other items

are all about the same in moisture content so in mixing there should be no tendency toward increased moisture. If you do happen to get your feed too moist you may sprinkle it with corn meal and work it over until it is just right. Here is a good way to test your feed. Take a handful and squeeze it. No moisture should be in evidence and the lump should crumble readily. This is what is meant by "crumbly moist." Try it out.

You now have the daily menu. This should hold good for about two weeks when a change should start in a very gradual manner. Decrease the amount of egg or custard and increase the amount of meal. At the end of four weeks the egg or custard should no longer be in the feed. In the same way, when the birds are about six weeks old, cut out the 2 o'clock feed, and a month later eliminate the 10 o'clock meal. The birds will now be eating at the natural time for game birds, morning and evening. Here is another hint that you may find valuable in your work. Even quite young birds respond to their natural instincts, in that they will usually, at an early age, show signs of wanting more feed at the early morning and late afternoon feeds. Watch for this peculiarity. In fact, watch your birds more than you do the clock, and you will find out many very interesting facts.

When the birds are about eight weeks old, it is a good time to introduce the scalded chick or pullet scratch. This food may be prepared by placing the amount you want to use in a bag and letting it stand in boiling water for about twenty minutes. Remove it and hang up to drain and dry out. It will quite well take the place of a part of the pheasant meal and thus reduce the cost of the food.

As the birds mature they will consume more greens, if it is possible for them to get them, and you will find that you may further reduce the cost of feed by providing more greens and you will at the same time be insuring your birds against some of the troubles that come to those who forget this very important element of food.

Provide plenty of greens, cover, good water, and clean roomy pens, and you will surely be rewarded by a fine lot of strong, healthy birds, and really get the return on your investment that you are entitled to expect. Eternal vigilance is the price of good birds.

HOW TO HOLD AND DUST A HEN.

As it is most essential to have your brood stock clean and wholesome, it is well to know just how to do this work easily. In conversation with a farmer from whom I had been buying a number of setting hens, the question of dusting came up. I asked him how he did it and he said: "I hold the hen while my wife applies the powder, and it is the worst kind of a task." We were standing near the chicken house, so I said: "Let me show you how it is done at the game farm." This is the procedure.

Place your left hand along the back of the neck of the hen, grasping the left wing close to the body with your thumb, and with the little finger and the next one to it, get hold of the right wing of the hen. Gradually pull the two wings close together and lift the hen off the nest. As you hold her in the air or close to your body, quickly turn your wrist over to the left and you will find the feet of the hen sticking up in the air, and you are now ready to go to work with the right hand.

In using this system you will always be able to get the powder where it belongs, and that is on the skin of the hen, and not on the outside of the feathers. Take a pinch of the sodium fluoride between your thumb and first finger and place it against the skin before you release it. Then after you have released it, ruffle the feathers with your hand.

Lice are most often found around the base of the tail, under the wings, back of the neck, and on the underneath side of the body, so these are the places to put the powder, remembering that the powder must reach the skin to be effective. Dust the hen when she is set, and on the seventh and fourteenth days of the incubating period. Do not dust the hen within five days of the hatching time.

WE MUST PRODUCE IF WE WOULD DESTROY.

By 'Gene M. Simpson, Superintendent Oregon State Game Farms.

The early settlers of this country found game so plentiful that it seemed impossible for it ever to disappear. In the prairie states of the middle west the prairie chicken will soon be but a memory, but the pheasant is taking its place. Propagation in captivity has made this possible, in fact propagation is the only solution of the future game supply. Propagation in captivity saved the buffalo from extinction, and would have saved the passenger pigeon, had it been possible to secure a mate before it was too late for the last remaining specimen, a female, which died in the Cincinnati Zoo about sixteen years ago. Once the most abundant species ever known in any country, selling in the market in Boston in 1736 for twopence per dozen, the passenger pigeon was exterminated, but exactly how no one knows.

Many states have one or more state game farms, others buy game birds from private game breeders for releasing each year. Better success has been had in propagating pheasants than with any other game bird. Up to the present time no one has successfully reared in captivity any of the true grouse species. For the present, at least, we should confine our efforts to the pheasant, wild turkey, native quail and Hungarian partridge. Regardless of the fact that European authorities claim they can not be raised in captivity, American game breeders will raise the European gray, or Hungarian partridge, and raise them successfully. The proper mating of the breeding stock and their care during the laying season seems to be the all important factor in their management. Oregon has had an open season on Hungarians in one county, and a bill is now before the legislature opening two additional counties.

HUNGARIAN PARTRIDGES.

Thirty-seven pairs of Hungarian partridges were liberated in Garfield County, Washington, in the spring of 1914. From this planting the birds have spread into all adjoining counties, and into Wallowa County, Oregon, and over half a dozen counties in Idaho. Mr. C. A. McCabe, chairman Garfield County game commission, in a paper read at the Washington State Association of County Game Commissioners and Game Wardens annual convention in Seattle in January, said:

"Last fall (1926) we had an open season of six weeks, commencing September 16th, with a daily bag limit of eight, and no season limit.

FIG. 22. Feed room and breeding pens at the Pendleton Game Farm, Pendleton, Oregon.

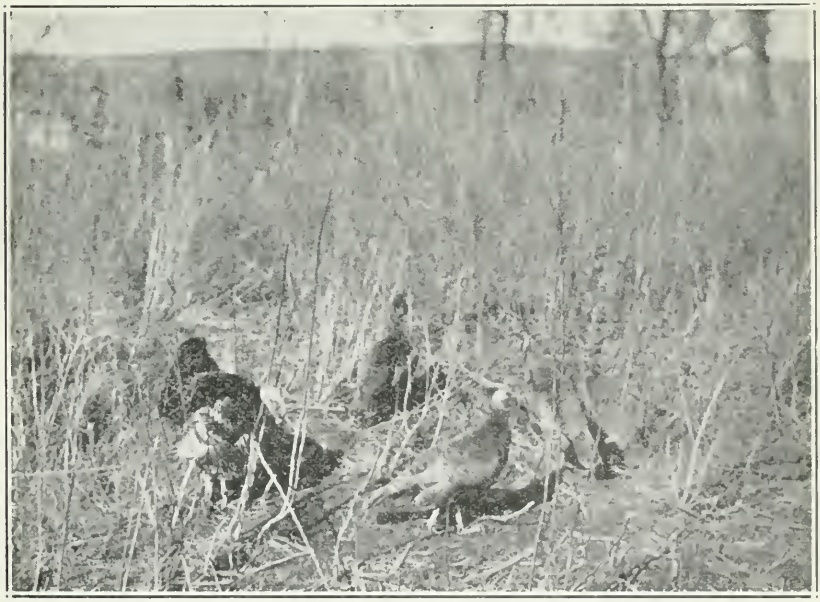


FIG. 23. Virginia wild turkeys are being reared on the Oregon State Game Farm at Pendleton, Oregon.

I believe an estimate of a bag of ten thousand in Garfield County this year is conservative, and I do not believe the kill ten per cent. I believe the birds left today in this county at present market prices represent an actual asset of between one-half and one million dollars. And all this comes from an initial outlay thirteen years ago of $375.00, with our neighbors as bountifully supplied as we are.

"Although from Europe, the partridge does not believe in marriage by arrangement or of convenience, but follows the American custom of personal selection of mates, and therein lies the difficulty in rearing them in confinement.

"Their introduction has been the greatest outstanding accomplishment in aid of the sportsmen in the history of our state."

The Hungarian partridge possesses the alertness and cunning so necessary to outwit their many enemies, man included. From the fact that they completely cover their nests with grass, leaves and dirt, their eggs are found with difficulty. This trait alone protects their eggs from the depredations of crows, magpies, bluejays, and no doubt also from skunks and small predatory animals.

It is claimed by some people who ought to know better that the imported game birds in this country have driven off and killed the native game birds. We would be having mighty poor upland game bird shooting in the Pacific Northwest today had it not been for the importation of the Chinese pheasant and the Hungarian partridge. Even had the Chinese pheasant never been introduced our native grouse and quail would have been just as scarce as they are today. In fact, they would have been more scarce, because the hunter would have confined his attention to them and their extermination, for they can not withstand the trained dog and pump and automatic gun, as the Chinese pheasant can. The fact that the pheasant produces two, and sometimes three, broods a year is the strongest argument for their desirability as a permanent game bird over the native birds with their one brood. An unfavorable season may materially reduce the broods of the native birds, but the pheasant has two or three chances in the season.

Closed seasons and reduced bag limits will not bring the game back. We must produce if we would destroy. Mr. E. A. Quarles, formerly secretary of the American Game Protective Association, and founder of the American Gamekeepers' Society, in addressing the National Game Conference of the American Game Protective Association, held in New York City, December 6 and 7, 1926, said: "Why is it possible for thousands of sportsmen without means to belong to private clubs to share the joys of their more fortunate brethren in sport with upland game? Ask the gunners of Oregon, of New Jersey, of New York and the answer will be respectively, ''Gene Simpson, Duncan Dunn, Harry Rogers.' The public game covers of these states teem with ring-necks, due to the genius of these three veterans, history makers in the development of our present day sport with the gun."

The early history of the first importation of Chinese pheasants into Oregon is well known. Less than 50 birds were brought from China in 1880, by Judge Owen Denny, then United States Consul General at Shanghai, and liberated in Linn County, Oregon. Mrs. Denny, Judge Denny's widow, now in her 90th year, resides in Portland, Oregon,

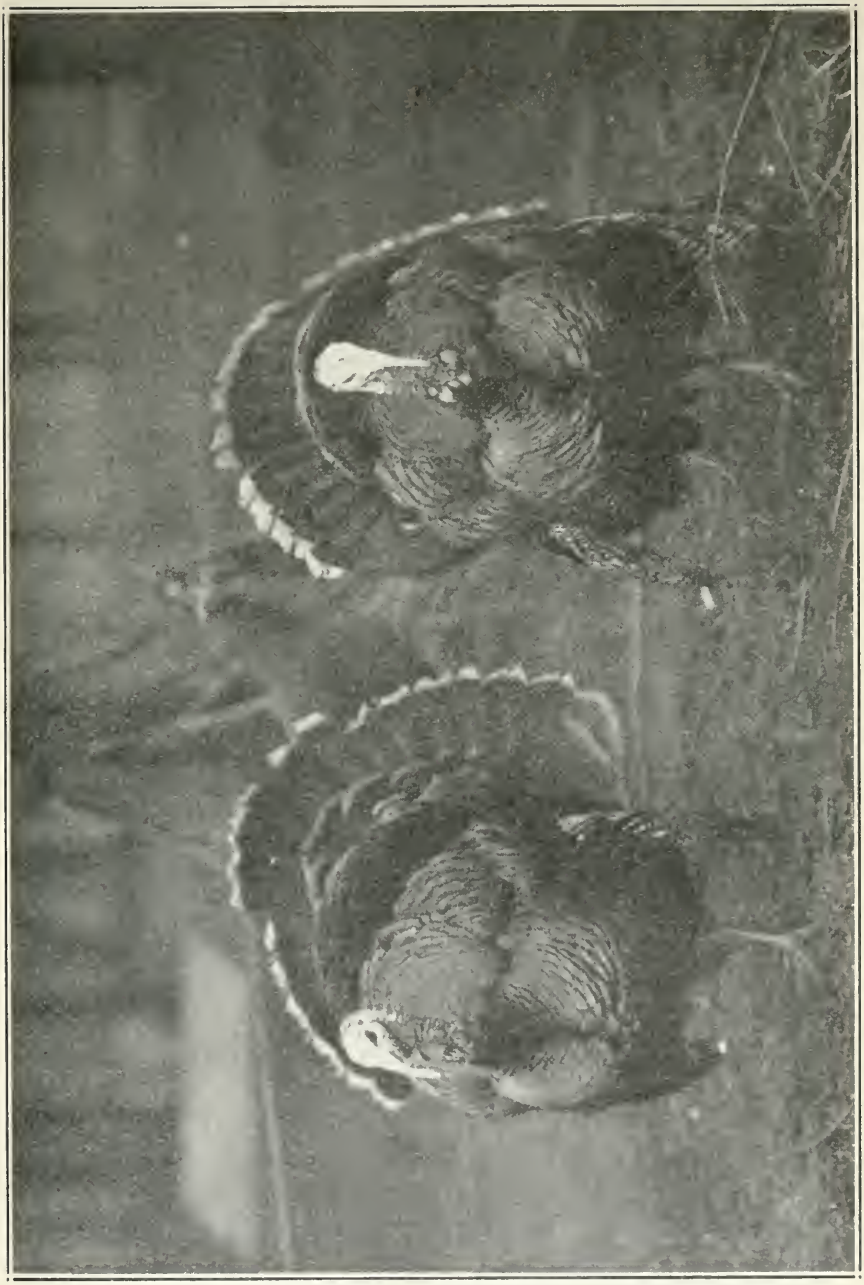


FIG. 24. Pure Virginia wild turkeys, Oregon State Game Farm, Pendleton, Oregon.

and draws a pension of $50.00 per month from the State Game Fund, and will continue to do so as long as she lives. But it is not generally known how California missed being stocked with pheasants. Before returning to the United States Mr. Denny made arrangements with a Mr. Redding, of San Francisco, to receive and liberate a shipment of game birds. A shipment of nearly 90 birds arrived at the wharf, San Francisco, as the funeral procession of Mr. Redding was taking place. He had died suddenly and no arrangements had been made to receive the birds. The birds had to be taken from the boat, and, no one seeming to know anything about them, the sailors finally bartered them off along the waterfront.

WILD TURKEYS.

Wild turkeys, our rapidly vanishing national game bird, can be raised in captivity even easier than our domestic varieties, and we should lose no time in doing so. The wild turkey, the largest game bird in the world, so numerous throughout the eastern and southern portion of the United States in earlier days, is now greatly reduced in numbers and found only in a few favored localities. Even now it is difficult to find the pure wild stock, for the reason that they have so intermingled with the domestic flocks in the vicinity of their range.

Not all localities are suitable for stocking with wild turkeys. Oregon is successfully stocking the counties bordering on the California line, and no doubt California could do likewise in the northern portion of the state.

The Honduras or ocellated wild turkey of Central America, is the smallest, most brilliantly colored and the least known of all the varieties of wild turkeys. While this bird has never been domesticated it undoubtedly could be raised in semidomestication and might prove a worth-while game bird for southern California.

Early explorers of North America found the wild turkey a welcome source of food supply. So plentiful were they that in 1711 they were sold in Connecticut at one shilling fourpence each. Alert and cautious in the wild state this grand American game bird, when raised in captivity, refuses at first to revert to its primitive state when liberated. Broods hatched in the wild state, however, assume all the wild characteristics of their progenitors, providing they were liberated far enough away from the haunts of domestic turkeys, with which they are wont to fraternize.

DOLLAR-A-YEAR WARDENS.

By Walter R. Welch, Field Assistant.

About a year ago an appeal was made to the Fish and Game Commission through the Associated Sportsmen's Clubs of California to appoint men who might volunteer their services as deputy fish and game commissioners to assist the regular patrol in the protection of fish and game and in the enforcement of the fish and game laws.

Although the Fish and Game Commission had at one time appointed a number of men from the various sections of the state to act as volunteer game wardens only to find a great majority of them a liability

rather than an asset, and although several other states had met with the same experience in the appointment of men to act as volunteer game wardens, the commission decided to consider the appeal of the sportsmen.

Upon investigation it was found that in order that those appointed as volunteer game wardens be empowered with authority to make arrests for violations of the fish and game laws, it would be necessary that they be regular salaried deputies of the commission. Therefore, the commission decided to pay the volunteer game wardens a salary of one dollar a year. Thus the term "dollar-a-year game warden" originated.

After the lapse of several months, and the appointment of a number of men to act as dollar-a-year game wardens, all of whom had been sponsored for the position by various associations and clubs within the state, the commission found that these men were not accomplishing what their enthusiasm had led them to believe they could, and that something must be done to have the dollar-a-year wardens become more active and efficient and to have them coordinate with the regular patrol in the enforcement of the fish and game laws and in the protection of fish and game, or it would be necessary for the commission to abolish the policy of appointing dollar-a-year game wardens.

Prior to making that move the commission decided to endeavor to organize the dollar-a-year game wardens throughout the state into an active, efficient, harmonious, cooperative body to coordinate with the regular patrol for the protection of fish and game and the enforcement of the fish and game laws.

This is the first move of the kind that has ever been undertaken in this or in any other state, and it is believed it will result very beneficially to the protection of fish and game and in the enforcement of the fish and game laws.

As it is the desire of the Fish and Game Commission that the enforcement of the fish and game laws be clean and just in all ways, the record of the successful game warden does not depend so much upon the number of arrests he may make as it does upon his ability to educate the people of the state as to the value and necessity of the fish and game laws, and to suppress violations.

All dollar-a-year game wardens work under the direction of the regular patrols, through a captain in the county in which they reside.

All dollar-a-year wardens work under a regular system and their activities in the field are confined to the counties in which they reside, except in cases where a violation of the fish and game laws is committed in their presence, or when they have been detailed to perform special duties outside their respective counties.

The work of all dollar-a-year game wardens is directed and controlled under a system similar to that governing the regular patrol, and they are vested with the same authority as that of the regular wardens for the enforcement of the fish and game laws in all sections of the state.

Attention is called to the fact that while the dollar-a-year wardens perform duties similar to and assume all the responsibilities of the regular patrol, they receive no compensation for their services other than that of one dollar a year.

The efforts made by the dollar-a-year game wardens for the protection of fish and game and in the enforcement of the laws are prompted solely by their interest in wild life conservation for the benefit of the people in general, and by their desire to aid the Fish and Game Commission in its work to that end.

Thus far the counties of San Joaquin, San Francisco, Alameda, San Benito, Santa Cruz, Santa Clara, San Mateo, Monterey, Contra Costa, Humboldt, and Los Angeles have been organized, and the dollar-a-year game wardens in these counties, in coordination with the regular patrol and with the cooperation of the sportsmen, have accomplished splendid work in the enforcement of the fish and game laws, and in the protection of wild life in general.

Men, who from pure love for fish, game and wild life, will volunteer their services for its protection and conservation, and who will assume all the responsibilities, risks, and hardships surrounding game wardens in the performance of their duties in the fields and on the streams surely merit, and should receive, the confidence and respect of every sportsman and the full support of all of the people.

BELIEVE IT OR NOT.

By August Bade.

THE MOTHER INSTINCT.

It was the custom at the Walla Walla farm to hatch about one hundred mallard ducks each year. A lake that covered about an acre of ground afforded the grownup ducks a most excellent place to live. This lake was bordered by an alfalfa field that gave the hens a fine place in which to nest. But a great many eggs, especially at the beginning of the laying season, were dropped around the edge of the water. These eggs were picked up each day and finally set under an old domestic hen. It was from these eggs that we hatched many broods of ducklings.

When the little ducklings were about two weeks old they and their foster mother were placed in a small enclosure about one hundred feet square that had a walled-up pool in the center. Here is where the hen began to realize what trouble was as she lost complete control of the brood so far as the pool of water was concerned. But in a short time, when she found that the water did not in any way hurt them, she became reconciled and they took their daily or rather hourly dip as a matter of the day's work.

It so happened one year that we had hatched four goslings of a large domestic variety. When these were about three weeks old they were also placed in the enclosure with the ducklings. It was not long until I noticed one of the goslings had a brood of young ducklings with her and was apparently playing the part of mother to them. A little further investigation proved this was correct. She had actually robbed the old Buff Orpington of her entire family. There was very little difference in the ages of the goslings and the ducklings but of course there was a vast difference in their respective sizes.

NATURE HER OWN PHYSICIAN.

About a week after the hunting season had closed a farmer called me one Sunday afternoon saying, "My hunting dog has brought in a crippled cock pheasant." It was the custom to go out and get all birds or eggs that were reported by the farmers to save them from destruction. It was found that this bird had a very badly broken right wing, evidently from a gun-shot wound at least a week before. The large bone was completely shattered and only the muscles and skin were holding it to the bird's body. It looked like a very hopeless case, but I thanked the man for his interest in the matter and took the bird back to the farm.

My first thought on reaching the farm was to cut the bird's head off and end its suffering. But remembering other cases in which birds had recovered, but none of them as bad as this one, I concluded to try and learn more about nature's way of handling bad cases.

I placed the bird in a pen that had in one end a great deal of cover. This pen was known on the farm as the "hospital pen." The bird crawled into the covering with the broken wing dragging at its side. For about two weeks I never saw the bird and had concluded that he was dead. But one day I saw his head as he peeked out from the covering. In about another week I caught a glimpse of him and could see that the wing did not hang so low. I felt encouraged and it was not many weeks before he could be seen around the pen with the other birds and while the wing hung a little low it was not dragging the ground as it was on the Sunday afternoon when he first came to the farm.

The following spring he was liberated with some other birds and could fly just like the rest of them. The wing had resumed its proper position at the side of the body, and with the exception of a small enlarged place at the break, was just as good as ever.

GAME PROPAGATION.*

By August Bade, Superintendent California State Game Farm.

It has become apparent to the close observer that our game birds and many game animals are decreasing at an alarming pace. So quietly and systematically has this depletion taken place that in many cases the birds have almost become extinct before sportsmen realized the real conditions. We will not endeavor here to set forth the reasons for all this shortage in our wild game, but suffice it to say that better roads, the automobile, and the general settling up of the more remote districts have had their share in this orgy of depletion.

As my work is particularly with game bird propagation I will touch upon that phase of the question only. In the limited time allotted it will only be possible to scratch the surface in the hope that some idea or thought of helpfulness will be dropped.

As the first year of the new farm at Yountville is now a matter of history, I wish to take this opportunity to thank the men in the field who have so whole heartedly cooperated in the work of distribution,

* Address given at Second Annual Convention California Fish and Game Commission Employees, San Francisco, February 8, 1927.

and made it possible to take care of a large number of birds successfully. From the Imperial Valley in the south to Mount Shasta in the north we have had nothing but the heartiest of coordinated effort from deputies and sportsmen's organizations. There has been an entire absence of that spirit of "let George do it," and while the work was new to many, it must be said in all fairness that it was done well.

To the question most often asked, "What are you going to raise in the largest numbers at the farm?" my answer has always been the same, "The ring-neck and Mongolian pheasants." We will devote a great deal of time to other birds, such as the valley quail, Hungarian partridge, and other native species, but you will readily understand and agree with me, when you know this king of all game birds, the ring-neck pheasant, more intimately, why he has been selected as the object of the chief concern of the work at the farm.

This bird more than any other, because of certain traits of character, lends himself to domestic propagation readily. His ability to care for himself under adverse conditions, either climatic or from a food supply standpoint, is now taken as a matter of fact by those who know him best. As is sometimes the case, if he should fall down on the job assigned to him, much investigation and comment is at once indulged in. He has made good in so many cases that we have come to look upon him as invincible. He has been transplanted from his native country into nearly all the temperate regions of the world, even including many islands of the sea.

How well he stands the rigor of northern climates is testified to by many sportsmen, as well as the writer, who has seen thousands of them in snow varying from a few inches to two or more feet in depth with the thermometer from eighteen to twenty degrees below zero. To sum it all up in a single sentence I would say that he is the most versatile game bird to be found anywhere.

Then there is another angle to this fellow that few people know about and one that is seldom stressed by writers and speakers—his relationship to the welfare of mankind. These birds do little or no harm to crops of any kind, although they are wrongly accused in many instances. In nearly all cases, when the facts are laid on the table and the evidence is weighed, the bird is pronounced "not guilty."

You may observe them making regular trips into the grain fields morning and evening, not for the purpose of destroying the grain but because insect life is more plentiful there than elsewhere. This bird is purely insectivorous and considers wireworms, cutworms, beetles, and bugs of every kind a very delicious dish. What better ally can the farmer have than this tireless destroyer of his arch enemies?

Many farmers who have come to know the economic value of the bird have posted their lands against hunting and would not even kill one for themselves. One farmer upon whose lands the birds had been planted by the writer, came back and asked for more, explaining that he had cut an extra crop of alfalfa hay because of the presence of the birds which had cleaned his field of wireworms.

Another case that was brought forcibly to the attention of the writer concerns a location near Twin Falls, Idaho. In 1916 a number of the farmers in that section brought in a number of pheasants and planted them on their ranches in order to have a little private shooting of their

own. They had agreed to protect them over a period of five years and that agreement was carried out. In 1922 that section of Idaho was visited by a terrible scourge of grasshoppers. All vegetation of a green nature was completely wiped out. Many farmers lost heavily in destroyed crops. But it was not so with the men who had the birds on their places. They suffered no loss and were sports enough to give credit to the birds. Many more incidents could be cited but we will give just one.

William Beebe, who possibly knows the pheasant as well as any living man, having studied them in their native haunts and written the most authoritative treatise upon them that has ever been published, has this to say: "One can best realize this when he sees the hundreds and thousands of ring-neck pheasants living in and about the grain fields of China, doing no damage, but probably doing much to keep down insect pests. Now that the Chinese are, with other occidental innovations, taking to a meat diet, the pheasants are immune in none of their natural haunts save where the Buddhists and Hindus hold sway. Everywhere, they are trapped, snared, shot with real guns, or killed with poisoned arrows. In all British colonies they are protected by well regulated game laws, and the hen and her brood of young birds are immune."

Taken as a whole, pheasants are more adapted to domestic breeding than any other group of birds. Long after the last native game bird has disappeared you will still find the pheasant being bred in a domestic way. They will not only be found supplying sport but food for a large number of people.

Just a few words now regarding the best way of propagating these game birds for the benefit of the sportsmen in general. He is the fellow who is "paying the freight" and is entitled to a legitimate return on the money he has invested through a hunting license.

In the old countries pheasants are to be found mostly on the large estates and only afford sport to limited numbers. Of course the land owner pays the bill and has the right to say who will enjoy the sport of the open season. We have improved a little on that method and have conceived the idea of creating certain closed areas where the birds are planted and allowed to multiply and stock the adjoining territory. This plan has been used by a number of states with success. Pennsylvania is one of the outstanding examples. No one can say they are not pleased with the scheme.

I have always been an advocate of the closed area, or bird sanctuary as some are pleased to call it, and at the same time believe the idea should be carried still further, so that new blood in the form of added stock each year from a state game farm or other source of supply, can be added in order to build up the vigor of the stock and at the same time increase the size of the individual birds. Experience in liberating domestically reared birds into closed areas has proven the wisdom of this scheme.

In order to have these closed areas and carry the scheme to a successful conclusion it is necessary to place responsibility on certain shoulders. Not only should the area be well marked with signs of warning, but a reasonable amount of vermin control is necessary and all poaching reduced to the limit. This sanctuary must become the

quiet congenial home of the birds, where they can not only be safe from physical harm but rest in comfort and quietness.

No locality or section of the country will ever get the best results from bird propagation until there is more general understanding of the value of bird life and a fuller realization of the costs in time and money expended.

Well established sanctuaries, more game farms for actual production and distribution, a little careful supervision in vermin control will go a long way to bring back the conditions that the "old timers" like to tell us about.

SECOND ANNUAL CONVENTION EMPLOYEES OF THE CALIFORNIA FISH AND GAME COMMISSION.

By Rodney S. Ellsworth.

For the three days of February 8, 9 and 10, the employees of the Fish and Game Commission convened the second time in San Francisco. There were over a hundred in attendance at the convention and every department was represented of those who share in the conservation and protection of the wild life of California.

The big feature which the convention made possible was the opportunity afforded to so many men from so many sections of the state engaged in so wide a range of activities to assemble and obtain a broader view of the work of the Commission. Seldom do these men have an opportunity, even through the medium of correspondence, to exchange ideas and experiences. The convention filled a long felt need in this respect and all realized the benefits derived from personal contact. The older members were impressed by the caliber of the new men while the younger members, in turn, were proud of the fact that they were associated with such a splendid body which through the years has gained the respect and confidence of the people of California. Everyone left the convention more enlightened and better fitted to go out in the field and carry on.

It is interesting to hark back to the first convention of the Commission which so impressed everyone and resulted in a demand that meetings of the same kind be held every year. The commonest belief was that the first convention was an experiment. However, this idea has been banished, for the success of the second convention assures that the experimental stage is over and that assemblies of those devoted to the preservation and increase of the state's game will be a permanent fixture in the Commission's activities.

One of the objects in the reorganization was to make the commission function as a business. Consequently, it was gratifying to observe throughout the convention how nearly the Commission assumed the character of a big business concern and how closely its workings resembled those of any modern corporation.

The convention was a real success. There is no doubt about it. The program was educational and instructive to a high degree. Many problems were presented and discussed and some excellent papers covering a wide range of subjects were given. Each speaker had information

of value. Some had worked out problems of the greatest interest and of importance of the future.

The following resolution was passed before the conference closed:

"*Resolved*, That we, the employees of the California Fish and Game Commission in annual convention assembled, do here wish to express to the commissioners and their executive officer our sincere appreciation of the opportunity afforded the employees of this Commission to meet together and discuss our mutual problems and to know each other better, and to express our hope that these conventions may be continued from year to year in the interest of mutual betterment, and of better service to the state."

The opening address of the convention was delivered by President Zellerbach who stated that the Commission since its reorganization has been trying to make itself attractive to the people of California and to the sportsmen from a business standpoint and to convince them that every dollar spent for licenses by them meant a consequent increase in the Commission's program of conservation. "Let the people know this is their Commission and we shall be entitled to their support, their help, their sympathy and to the extent that we receive these things, to that extent can we succeed."

The principal speaker at the opening session, A. E. Heron, chairman of the State Board of Control, discussed the proposed reorganization of state departments having to do with natural resources. The unification of various bureaus dealing with agricultural problems at the last session of the legislature, he pointed out, has resulted in better coordination and proved advantageous in many ways. Hence, the plan is to continue the grouping of the numerous state bodies having problems in common so as to more effectively administer the state's business. The next step is to group the various boards of forestry, mines and state parks with the Fish and Game Commission under one head Department of Natural Resources. The director of this department is to be a member of the governor's cabinet. The Fish and Game Commission under the new grouping, Mr. Heron emphasized, is to function as in the past. Its autonomy is to be left undisturbed and it is still to control and have the use of its own funds.

Other features of the first session were papers on "Educational Work with Young Offenders" by Deputy W. B. Sellmer; "Dollar-a-Year Wardens" by Field Assistant Walter R. Welch; and "Game Propagation" by August Bade, superintendent of the State Game Farm. A synopsis of these papers is not necessary as two of them appear in this issue and the other will be printed in a future issue.

Mrs. Pearl Ford, assistant to the executive officer, gave a very interesting talk on a seemingly dry and featureless subject, "The Routine of the Executive Office in Relation to Employees." Mrs. Ford stated that many surprises break the monotony of reading the stack of mail delivered to the Commission every day which she sorts out and delivers to the proper department. In one day's mail she received requests for information ranging from how to raise frogs, to requests for permits to keep crippled ducks, or to ship deer hides, and reports from fur trappers, on pollution, and on the good work done in the past by some warden.

The mock trial on the evening of February 8 will be long remembered by all. Wilful Violator with his glorious red shirt, flowing beard and stern, honest face, his dear loud wife, Burgundy, his huge stupid son, Vermuth, and his round, enormous daughter, Angelica, were a sight to move to pity the cold, stony heart of any judge save that of an Irishman. Unfortunately, for Violator the judge happened to be an Irishman who would have justice done in his court and who declared that it would be well done, too. As a result Angelica's streaming tears and Burgundy's broken cries were ineffectual. The prosecuting attorney was quick to notice the judge's keen sense of justice and with great adroitness drew forth the evidence to prove Violator's guilt. The attorney for the defense battled with wit and spirit and when the jury rendered a verdict of not guilty, his spirits rose. However, the judge would have justice over done and after telling the jury they were wrong changed the verdict.

In all, it was a jolly, good spectacle and kept the audience in an uproar. Without the humor of Judge Pat Parker, or the ridiculous objections of both attorneys, George Smith and B. D. Marx Greene, it is difficult to believe that the trial would have afforded so much wholesome enjoyment. Nor could the good points of law which were carefully brought out by both defense and prosecution be overlooked by those whose duty it is to know how evidence and witnesses should be used in a jury trial.

"The Viewpoint of an Onlooker" was the subject of a very able address made by Mr. Charles Dunwoody at the morning session of February 9. Mr. Dunwoody is secretary of the conservation section of the California Development Association and his address follows this review.

The discussion of law enforcement problems which J. S. Hunter led proved one of the most lively topics of the morning. The outcome of the discussion was to the effect that law enforcement depends not alone upon the energies of officials charged with the duty of apprehending violators, but also on the nature of the public sentiment back of it. Patrol Captain M. S. Clark, of the San Francisco district patrol, in demonstrating the right and wrong way of checking a bag showed the effectiveness of enforcing the law in a way to command the respect of the sportsmen rather than his contempt.

R. E. Ludlum presented a brief for the reasonable control of predatory animals stating that the problem was one worthy of the serious consideration of both the stockman and the game conservationist. "The damage to forage and other growing crops caused by rodents, each year, is very great; thus reducing the food supply available for both domestic stock and game. Predatory animals are nature's check on rodents and should be reasonably conserved for this purpose. The abundance of predatory animals must also be controlled so that they do not increase to the extent that they become a menace to domestic stock and game.

"In this connection," he stated, "the work of the commercial trapper can not be discounted. There were 3530 trappers in the field during the past season and the state had their services in the control of predatory animals without a cent of cost. These men made but $73 each on the average and, unless fur-bearers like skunk, coon and fox are given

some protection, it will not be long before commercial trapping will be so unprofitable that the burden of predatory animal control will be placed on the state and will have to be paid out of state funds."

N. B. Scofield gave a history of the work and accomplishments of the Commercial Fisheries Department. An extended report of his remarks is appended, as it well serves to bring out the most extensive investigational enterprise into which the Commission has yet entered.

John Spencer, hydraulic engineer, discussed the screen and ladder problem. He stated that standard forms had been devised, installations were on the increase and that a systematic attempt was being made to see that ladders and screens throughout the state were functioning adequately.

The chief interest of the afternoon session centered about the addresses of W. H. Shebley and G. A. Coleman. Mr. Shebley has been called the dean of fish culturists and is one of the ablest men in the country in fish culture. His review of fish planting proved one of the most interesting and enlightening papers of the convention and readers of this periodical should with reason look forward to its appearance at a future date. Mr. Coleman's narration of his biological investigations of the food of trout and the conditions under which they exist strongly interested his hearers. Of especial interest was his explanation of the effect of wind action in the circulation of lakes. Only lakes less than twenty-five feet in depth have circulation to the bottom and a knowledge of this feature is as essential to have when a species of trout is to be planted in a lake as a knowledge of the adequacy of the food supply.

The executive officer, B. D. Marx Greene, told of the new program of fish planting in his usual forceful manner. In fact, credit is due the executive officer for the initiation of many features of the convention and for the general interest which he stimulated in it.

During the morning session of February 10, the California Academy of Sciences and Steinhart Aquarium were visited by most of the deputies. That the visit was of benefit is little doubted, for the opportunity afforded a chance to know more about the animals and fishes of the state. Many considered it a special privilege to be "back stage" to see the mechanics and system of operations of the aquarium.

At the afternoon session the United States district forester of California, Stewart B. Show, discussed the many problems and interests that the forest service and the Commission have in common. "We in the Forest Service," he said, "consider wild life conservation with the assumption that fish and game are to a very large degree a production of the forest, because it is obviously true that we mean by forest all forms of native cover in our mountain side. To a very large measure then, we of the Forest Service have an interest in the protection of fish and game.

"If we go a little more into detail, we find that both the Commission and the Forest Service have an educational department. Both of us desire to teach the public the purpose of our organizations and to make the public willing cooperators with us rather than apathetic enemies.

"Another angle in our mutual problem of fish and game development and administration is the relation of fires in forest country to fish and game. We have in many specific instances definite information about the magnitude of losses caused by fires. In one case in Butte County

last fall the remains of seventeen deer were found after a fire. The destruction of small game also is tremendously impressive and is likely to equal, perhaps exceed, in some cases the kill by hunters.

"This points directly to the necessity for the closest possible cooperation between the two groups. Both of us have before us education of the general public to the point of view that fires are highly detrimental, not only to the fish, but also to game which is a product of the forest cover. Our two groups working together can make a great deal of progress in teaching the people the truth of the matter."

State Forester M. B. Pratt spoke on the same subject of the interrelationship between forests and game from the viewpoint of the state forester. He made it clear that though the fish and game deputy and the state forest ranger had interests in common, nevertheless, their services could not be effectively combined. The forest ranger would be deserving of severe criticism if he neglected his fire duties in order to prosecute a violation of the fish and game laws.

Dr. H. C. Bryant outlined the essential features of the educational program of the commission. Through the medium of an address on the difference between antlers and horns, he showed how natural history lore can be made attractive and how possible it is to awake the popular mind to the need and opportunity for a more sympathetic understanding of nature and her ways.

Deputy Ovid Holmes spoke on "An Educational Campaign Planned and Executed." He stressed the effectiveness of the Commission's activities in relation to its educational work in his own community and by means of several examples illustrated how the school children and business men of Fort Bragg had gained a new sense of their responsibility to the future in becoming alive to present day conservation of natural resources.

During the symposium in law enforcement which followed, numerous problems concerning the interest of certain localities with which particular deputies were familiar were brought to the attention of the assembly. Another notable feature of this section of the program was Deputy E. H. Ober's address on the mountain sheep of California's desert and high Sierra.

The central idea expressed at the convention in regard to law enforcement seemed to be that laws are unpopular because the public is not properly educated along the lines of law observance. Laws cease to be unpopular, however, when the public realizes that they are enforced not to prohibit hunting and fishing, but for the purpose of increasing the possibilities of sport and providing conditions the better to insure the increase of the state's fish and game by means of constructive methods.

Every citizen has an interest in the wild life of the state. The dawn of a new day will come when licenses are purchased not from fear of apprehension or arrest, but because the individual is in sympathy with the Commission, understands that the Commission is conserving the fish and game of the state for the benefit of this and future generations and desires to give his support to its program.

The session ended with a vote in favor of a service uniform for employees of the commission, these to be worn at the discretion of the owner.

The annual banquet brought the convention to a very satisfying close. Rolin G. Watkins was toastmaster and Irving Martin of the State Board of Control was the guest of honor. Superior Judge Pat Parker was also present. He was vested with the captaincy of the dollar-a-year wardens of Mono County as a token of the esteem in which the Commission holds him. President Zellerbach was in attendance and evinced again his lively interest in the Commission and his pleasure at being the head of so competent and loyal a body of protectors of the wild life of California.

The convention was a stimulating affair. Before it came, the majority of deputies knew of the Commission in the form of laws and reports, names and titles, observances and regulations. They were acquainted with its publications and with its executives and officials. Some had seen the buildings housing its hatcheries, and some few were familiar with the equipment of the fisheries laboratory. At the convention, however, employees looked into the faces of one another and knew that the Commission was a thing of life; a real living association of men, men with a vision.

Now the deputies have returned to their homes throughout all California; they know that the Commission is not a thing alone of buildings and names and reports. Yes, it was stimulating to be at the convention and all are looking forward to the next one when they can again consult and enthuse together.

THE DEPARTMENT OF COMMERCIAL FISHERIES.

By N. B. Scofield.

When the California Fish and Game Commission was first organized it was purely a fish commission and it was interested mainly in the introduction and propagation of food fish. The first act of that Commission was to bring the shad to California from the Atlantic coast, and the shad is strictly a commercial fish. The first fish culture work of the Commission was in propagating the salmon which is mainly a commercial fish. A few years later the striped bass was brought to California from the Atlantic coast. This fish is valuable for both its food value and its gaminess and is sought by both the sportsmen and commercial fishermen which has led to a never ending conflict of the two interests.

The salmon fishery was the first to be developed in California and it was to guard against the over exploitation of this fish as well as to introduce food and game fish that the fish commission was established. It was not until later that there was fear of the extermination of the game. When this fear arose the duties of the commissioners were enlarged and the organization became a fish and game commission.

The salmon fisheries reached their peak of production and then declined and the game and sporting end of the Commission became the more important and sportsmen were invariably appointed as commissioners. About 15 years ago the commercial fisheries of the state began to grow principally through the development of the sardine and tuna industries until now our fisheries produce more than four hundred million pounds per year and the wholesale value of the fishing prod-

ucts is about twenty-five million dollars. This is greater than that of any other state in the United States but is surpassed by the Territory of Alaska.

With this growth of the fisheries industry has developed an added interest in the conservation of the fisheries and the Fish and Game Commission has made commercial fisheries conservation an important part of its work.

In most states where they have important commercial fisheries they are administered by a separate commission. There is an antipathy between sportsmen and commercial fishermen which is unreasoning and hard to understand. This antipathy is greatly increased when the two interests are administered by separate commissions. It is better to have them in one commission so that their differences can be arbitrated by one commission which will be without prejudice toward either side.

The first sardine canneries of importance in California were established at Monterey but real development of this industry did not begin until about 1913 or 1914. At about this time, or in 1912, to be more exact, the tuna canning industry was started in southern California and developed rapidly.

To take care of the increasing amount of work caused by the developing fisheries the Commercial Fisheries Department was established by the Fish and Game Commission. At first it was not recognized as a department and its development was very gradual. The department has now become an important part of the commission and has in its employ about 35 persons. The main office of the department is at San Francisco and there are branch offices at Monterey, San Pedro and San Diego. At San Pedro we have a State Fisheries Laboratory where most of the scientific or investigation work of the department is carried on. The work is divided into two divisions, Patrol or Law Enforcement and Research and Statistics.

The department is financed by the money received from commercial fishing licenses and from a tonnage tax on fish used for packing and canning so that the department is self-sustaining, with an income near one hundred thousand dollars.

In 1915 some scientific men held a meeting in San Diego—an organization called the Pacific Division of the American Association for the Advancement of Science. As some of the canners were worried about the future supply of the tuna, an afternoon was set aside to discuss the problem. The leading paper given that afternoon was by one of the canners, Mr. Steele of San Diego. Mr. Steele stated that there were a number of tuna canneries, something like fifteen, that had been developed in southern California and that more canneries each year were going in. Those already engaged in the business were doubling their capacity each year. They were getting more fishing boats and the industry was developing at an enormous rate. It was the belief that the schools of tuna, or albacore, were smaller than they had been and they were in fear that the tuna was being overfished.

The question asked of the scientists there assembled was this: "How much fishing will the tuna stand without a drop in the supply? We want to know whether we have reached the peak of production and should curtail our development. Should we avoid putting more money

into the industry, and go on what we now have, or should we increase our investment or should we reduce it?"

This was a very practical problem put to the men there and an answer could not be given. In fact, there was no clear idea expressed of how to go to work to get the answer. I kept the question in mind, however, and determined that the goal the department would aim at would be to strive to answer this very practical question. We would steer clear of devoting all our energy to the study of the life history of the fish and get our work on a basis where we could guard against overfishing by determining as soon as possible how much fishing a given species could stand.

Shortly after this I read a paper by Will F. Thompson on the "Problem of the Halibut," published by the conservation commission of Canada. The total annual catch of the halibut in the North Pacific had increased each year and no less a person than the head of the United States Bureau of Fisheries, Dr. Smith, at that time made the statement that the halibut fishery of the North Pacific was apparently inexhaustible. Thompson investigated the matter and found that the government had no records of the catches or data on which he could work and find out what was happening. So he went to the captains of the halibut schooners and found that these captains, practically all of them, had very accurate logs in which they noted the days they fished, where they fished, the gear used, and what the catch was each day. Thompson gathered together all the logs he could, and from that data, extending over a period of years, he was able to determine what was happening in the halibut industry. He found that the catch per unit of gear was rapidly decreasing. The reason that the total catch was increasing each year was that more gear was being used and more boats were fishing.

In addition, it was found that the numbers of larger and older fish were decreasing. It was noted in all the logs that the larger fish were becoming scarcer and scarcer so that the catch was being made up of increasingly younger fish each year. These were two unmistakable signs of overfishing. The banks of halibut were being rapidly overfished.

After reading Thompson's paper I was quite sure that he was just the man we needed to develop a scientific program for the care of the fisheries of California, and to look for an answer to the question asked by the canners at San Diego. Thompson was employed in 1917. With his help, and that of H. B. Nidever, we developed a method of getting an accurate record of the catch, so that it could be used to determine what the relative abundance of the fish is year after year.

The present system employed in the State of California, in getting data of the catch of fish, is the most perfect that is in use any place in the United States or in any country in the world. It is working splendidly and gives us all the information that is necessary so that we can tell what is happening in any fishery—whether the fish are getting scarcer, holding their own, or increasing.

When we speak of our scientific work it sounds rather formidable and difficult to understand, but the object to be obtained is rather simple and the program is a highly practical one. As stated before we want to find out just how much fishing the sardines, the tuna or the

striped bass can stand. We are attempting to find out and are finding out whether these fish are being overfished, whether we should let the fishing go on as it is, or whether we should ask for measures to restrict the fishing.

When we started this work there was no authority under the law for carrying on scientific investigations by the Fish and Game Commission. We asked for a law which was passed by the legislature which makes it the duty of the Fish and Game Commission to carry on these investigations of the commercial fisheries and to determine the very points we are working for in our program for the conservation of the fisheries. So our work is required by law and we feel that we are on a rather solid foundation and that this work will go ahead.

Through the data of the commercial catch which we get, we have a measure of the abundance of the different kinds of fish. All fish are subject to fluctuations in abundance which are due to natural causes, the most common of which is the failure or partial failure of the spawn to produce a crop during one or more years, and we must determine whether a reduction in the number of fish or a scarcity of fish is due to the fishing operations or whether it is due to natural causes or to both. To find this out necessitates, besides the statistical work, a biological study of the species in question to determine the age and rate of growth. We have to know the relative size of the age or year classes making up the supply of fish in the ocean or river of that one species. We have to know this in order to understand what are the natural fluctuations. This all sounds rather complicated but it is a part of the process any one goes through who grows chickens on his ranch, or cattle or any other animal. You must know how many you have, what your crop is each year and how many you can kill each year and keep up your supply. It is harder to find this out where fish are concerned for they are where they can not be seen and the ocean is a very large place. To determine the abundance of a species of fish through data of the commercial catch may be a crude way to take a census, but it is the best way which is known and it is certainly far superior to guess work such as has been followed so often.

Thus a scientific program has been developed in California for the care of the fisheries which I believe is the proper kind of program for any state or government to have. We are so sure, that we have banked everything on it, and I am doubly sure we are right, for the reason that the United States Bureau of Fisheries has accepted the program and is backing it up.

THE VIEWPOINT OF AN ONLOOKER.

By Charles Dunwoody, Secretary, Conservation Section, California Developement Association.

It would seem that a new day is dawning for the sportsmen of California. For years we have been handicapped by policies that have long since become obsolete. We have had laws on our statute books that were inadequate to meet the demands of progress. The sportsmen who have provided the funds that made the administration of their wild life resources possible in the past have had no voice in planning that work.

Enforcement of our fish and game laws had become almost a byword and violators had grown to such numbers that the law-abiding sportsman had almost lost confidence in his fellow man.

Today we have before us quite a different picture. The sportsmen of this state are now permitted to give an expression of their views to your group with that assured feeling that those same views will be properly considered in the molding of your present and future policies.

The Fish and Game Study Committee of the California Development Association with which you are all familiar sat for one year of arduous labor in an effort to draw a picture of the fish and game needs of California as it was seen by the sportsmen of the state. The Commission was kept informed from time to time of the recommendations that developed out of the deliberations of this committee. The Commission has demonstrated its ability to quickly recognize these necessary progressive steps and when the committee had drawn its work to a close an analysis was made of its proposed policy. It was found that in almost every instance the recommendations set forth in the policy had already either in part or in full been carried out by the Commission.

Every successful enterprise must be builded upon a foundation of confidence. In the case of your organization the foundation of your success is embodied in the confidence of the sportsmen of this state. That confidence can only be gained by the result of your constructive efforts. You have already taken a long step forward in gaining this confidence. This fact is reflected daily in the general attitude of the sportsmen throughout the entire state. One important factor in bringing about this general feeling was the courageous action on the part of your organization in divorcing politics from fish and game. Another pleasing factor has been the consideration on the part of your body of fish and game as one of the state's important, economic assets, and the provision for a business-like organization with which to administer it. In this respect let me say that you are extremely fortunate in having for your executive officer a man of vision who recognizes the true value of coordination. He has that happy faculty of consulting those who may be affected by his decisions in an effort to make them just and fair. He is basicly sound in his policy of hearing all sides of a question before taking final action. Such a policy can not fail to win. Your splendid cooperation as evidenced by your dollar-a-year warden system is building a structure of law enforcement that can not fail to place California in the forefront in this respect. Your recognition of the necessity of complete cooperation between forestry and fish and game offers another factor in the sound development of your policy. I believe the day has passed when we can ignore the protection of the house in which our game lives and the food that nature has provided for the purpose of making possible its subsistence. A forest fire to a game warden should mean to him exactly the same thing as the burning of the buildings on one of the state game farms and the destruction of the available supply of feed.

Through your constructive work you are each day bringing about in the minds of those who do not indulge in either fishing or hunting a better understanding of the economic importance of fish and game to this state.

Your efforts in bringing about educational programs in the schools is another item worthy of commendation. In addition to instilling a

spirit of protection for wild life into the youngster you are planting in him the desire for an out-of-door life which if realized can not fail to develop clean minded men and women in the coming generation of Californians. It is a recognized fact that the largest percentage of clean square shooters is found in those who love the out-of-doors. Public education is essential if the people are to be expected to cooperate. As long as conservation is a dominant factor in the perpetuation of our fish and game, the people of California must accept fish and game as a responsibility as well as an opportunity. Your job is to make them visualize their responsibility. We must sell to our people the idea that fish and game has a real value measurable in dollars and cents in that it makes the state more attractive for the habitation of man and adds materially to the sale value of every acre of land within the radius of its influence. If the public once gets that picture your problem of lack of funds for propagation and protection will quickly vanish.

In closing I will sum up my vision of your organization in one sentence which I wish could be indelibly impressed into the minds of each of you. You are building today upon yesterday's accomplishments for tomorrow's achievements.

CALIFORNIA FISH AND GAME

A publication devoted to the conservation of wild life and published quarterly by the California State Fish and Game Commission.

Sent free to citizens of the State of California. Offered in exchange for ornithological, mammalogical and similar periodicals.

The articles published in CALIFORNIA FISH AND GAME are not copyrighted and may be reproduced in other periodicals, provided due credit is given the California Fish and Game Commission. Editors of newspapers and periodicals are invited to make use of pertinent material.

All material for publication should be sent to H. C. Bryant, Postal Telegraph Bldg., San Francisco, California.

May 25, 1927.

"If you hunt or fish, be a real sportsman. There is more honor in giving a square deal than in getting the limit."

INCREASED HUNTING AND FISHING LICENSE FEES NEEDED.

Sportsmen for several years have supported a move for better financial support of Fish and Game Commission activities through increased hunting and fishing license fee. In a state like California where wild life resources are great and where sporting demands are very heavy the need of better financing has become apparent to all. To improve patrol takes more money. To rear and plant more fish and more upland game birds increased funds are necessary. This need of increased fees was almost attained at the last session of the legislature and it is practically assured of attainment at this session because of both administrative and general support.

A considerable sum of money, something like $49,000, may be saved by revoking the ten cent fee paid for selling licenses and placing the entire distribution under the Bureau of Finance and Accounts. A state containing 158,247 square miles needs more than eighty game wardens to properly protect wild life resources. An increased pond system and thousands of brood fish are needed to supply eggs for the hatcheries and new buildings and equipment are necessary if an increased number of fish are to be planted to care for increased demand. A new patrol boat for the Commercial Fisheries Department will better cope with violators who deplete the marine fisheries. Educational and research work can be made to function more adequately with increased support. Never has screen and ladder work received the financial support this important project deserves. Continual drainage of lakes and marshes has necessitated making provisions for the purchase and supervision of wildfowl refuges if our supply is to be maintained.

That plans have actually been made for properly utilizing the enlarged income from the proposed increase of licenses to $3 for a single hunting or fishing license and $5 for a combined license, is indicated by the following outline:

1. *Administration.*

The only material increases are in the employment of five additional branch cashiers, and extra clerical help to care for the sale of licenses by the Commission itself, which is compensated many times by the saving of $57,500 now allowed for the commissions paid to county clerks and license agents. The total increased cost of distribution to the Commission will be less than $8,000 annually, a saving, therefore, of about $49,000. Additional allowance is made for extra cost of printing new licenses and for deer tags.

2. *Law Enforcement.*

The new budget provides for five additional captains, 50 additional deputies, one additional launch patrol captain, two additional lion hunters, ten game refuge tenders, and extra clerical force.

Provision is made for increased allowance for travelling expense account, new deputies and employees, and increased lion bounties from $7,500 to $22,000 per annum.

Provision is made for three new speed boats, ten outboard motors, six collapsible canvas boats, and full fish rescue equipment.

Provision is made for fencing and posting present game refuges at an expense of $15,000 per annum over a 4-year period, and $20,000 is allowed for constructing cottages in game refuges for refuge tenders.

3. *Fish Culture.*

Two new assistant biologists are provided for. One additional hatchery supervisor. Hatchery foremen increased from 17 to 25. Foreman assistants increased from 37 to 60. Watchmen are increased from two to five, and adequate provision is made for extra help.

The fish food is increased from $36,000 per annum to $48,000 the first year, then to $60,000, then to $72,000, where it stays constant; this is the food required for the brood fish which we expect to raise in our own brood ponds.

Adequate provision is made for the expense of a biological survey of lakes and streams.

Thirty thousand dollars per annum is allowed for fish planting, for hire of men, trucks and packing equipment. We will do all our own planting. Under equipment, new trucks are provided for the new hatchery, and 500 fish distributing cans per year.

Provision is made for two new fish distributing cars to cost $40,000 each and for 10 new hatcheries to be constructed over a period of four years in certain strategic positions.

Provision is made for two pond systems, each to cost $50,000, where the commission proposes to raise its own rainbow trout, instead of taking them in racks and traps.

4. *Commercial Fisheries.*

Provision is made for a new outside boat to cost $60,000 and for adequate crew to man it. Allowance of $15,000 is made for scientific apparatus to be installed on the boat.

NOTE—All of these items come from commercial fisheries revenue and not from increased license tax.

5. *Education and Rereareh.*

Provision is made for a zoologist and for a librarian. Considerable increase is given for printing bulletins, in raising the allowance from $1,250 to $2,500 per annum.

Provision is made for a laboratory and for a moving picture operator to take our own pictures.

A sufficient sum is allowed for additional lecturers to take care of crowds at summer camps.

Provision is made for increasing the circulation of fish and game magazine from approximately 7500 copies quarterly to 60,000 copies quarterly. It is proposed to have a very general circulation through service groups and other agencies.

6. *Statistics and Game Problems.*

This is now made into a new bureau and allowance is given for a director, a bacteriologist and a pathologist.

Adequate provision is made for a laboratory and annual supplies.

7. *Bureau of Hydraulics.*

This includes screens, ladders, and pollution. Additional help is provided for and equipment so that Bureau can function properly.

8. *Game Propagation.*

Provision is made for a new game farm at a cost of $30,000 and for additional help to maintain it. New auto trucks are provided for both farms so that we can adequately care for our planting.

9. *Permanent Improvements.*

It is planned annually to set aside $175,000 for the purchase of land for game refuges and public shooting grounds, which sum includes fencing, posting, and the construction of cottages in each.

DISCRETIONARY POWERS.

Constructive conservation of fish and game resources in California are dependent upon:

1. Legislation suited to the requirement of localities rather than whole districts.

2. Increased protection for fish and game under abnormal conditions. The closing of certain streams after fry have been planted in order to give them a chance to develop to the spawning age.

At the present time, the California Fish and Game Commission is powerless to give added protection to fish or game in time of emergency, or to suit protection to any locality. A law providing for discretionary powers is a law much needed at the present time. The action of the 1927 legislature will settle the matter as to whether more efficient conservation work can be accomplished in this state.

ACCOMPLISHMENTS VS. FUTURE PROGRAM.

Future plans should be made after reviewing accomplishments of the past. As a consequence, nature lovers may well review Dr. Hornaday's list of accomplishments in game conservation which are as follows:

1. Killing of nongame birds stopped.

2. Killing of game restricted to closed seasons which have steadily grown shorter. Long closed seasons for threatened species.

3. Sale of game prohibited both federal and state law.

4. Suppression of killing for millinery trade.

5. Creation of both state and federal refuges.

6. Limitation of destructive agencies.

7. Federal protection.

8. Propagation.

What are the stepping stones that should be added to these? At least three should receive immediate attention. Perusal of sportsmen's conservation magazines will quickly bring them to light. They are:

1. Extensive game refuges for waterfowl.

2. Administration of fish and game resources by trained experts.

3. Plenary powers for fish and game commissions in order to provide immediate action in cases of emergency.

CONSERVATION NECESSITIES.

Unless those interested in the conservation of our natural resources occasionally review the many factors which militate against the abundance of fish and game, improvement of conditions can not be expected. Of course, such a review always brings to mind how man continually upsets the balance of nature. Were it not for certain results obtained where interest in conservation has been developed, it would seem almost a hopeless task to improve conditions under modern civilization. Not only does man lay his destroying hand on the wild life of forest and field and the dwellers of the streams, but he pays little attention to the life requisites of fish and game. Most of his works are hostile to the success of wild life. He turns the sewage of his cities

into the nearest stream; the refuse of his factories, the sawdust of his mills and the refuse oil from his ships add to making the waters impossible as homes for fish. Even the automobile becomes a juggernaut of destruction to every form of life that crosses a highway on a moonlight night, as any paved road will demonstrate with its mutilated bodies.

One ray of hope looms on the horizon. There really is increasing interest in saving what wild life resources are still left. This interest is evidenced in the rapid growth of fish and game protective associations and the final unifying of them in California; it is evidenced by the numerous bills attempting better protection for various species which flood every session of the legislature; it is evidenced by attentive ears of service clubs and other organizations when conservation is mentioned.

Proper conservation in California is dependent first upon the requiring of needed data relative to the life history and habits of the various species, and second upon the united interest and activity of the state's citizenry.

IN MEMORIAM.

W. J. GREEN.

For many years, the man who unceasingly followed up reports of violations, the man who kept the markets under observation and the utility man called upon in every emergency was Deputy W. J. Green. He departed this life January 17, 1927, after an illness covering more than a year that partially incapacitated him physically but not mentally. To the last he was a most loyal employee and devotee of conservation.

He knew the violator and how to handle him, and was untiring in his efforts playing no favorites in his work. Those who knew him at Sacramento say he might be found at any hour of the day or night around the railroad stations and express offices watching for illegal shipments of fish and game.

W. J. Green was born in Perris, Kentucky. At seven he was in the saddle and a few years later became one of America's best known jockeys. In his early days he rode for Richard K. Fox, Marcus Daly, James R. Keene, and many other equally well known turfmen. The tracks at Windsor, Ontario, New Orleans, Louisville, Lexington, Saratoga, Sheepshead Bay—all these and many others knew him and his sterling efforts to put his mount under the wire, a winner.

Mr. Green became a deputy of the California Fish and Game Commission on November 1, 1911. The deceased leaves a widow, Mrs. Mary A. Green, and two stepchildren, C. R. Spickard, of Sacramento; and Mrs. Hilda L. McFall, of Auburn.

ANOTHER GAME FARM CONTEMPLATED.

Demands for an increasing output make it imperative that another game farm, the birds of which are to supply southern California, be established. Plans are that it will be modeled after the game farm at Yountville, with the exception that metal will be used for superstructure instead of wood thereby reducing depreciation. An adequate sprinkling system will be installed in order that cover and green food will be plentiful.

QUALIFICATIONS OF A GAME KEEPER.*

Ability to breed wild game in captivity and bring it to maturity in considerable numbers may well make its possessor proud. So far, however, only the first of the three major steps has been taken in so far as meeting the requirements of the gunner is concerned.

The activities of an entire breeding season wholly successful though they be, may and many times have been practically nullified by lack of experience in placing and holding game thus produced in natural or created covers.

Assuming that this can be done, our applicant still lacks the final step to qualify as a gamekeeper. Covers well stocked with game are not of avail unless the game can be brought to gun. No further exposition of this feature is needed before a gathering of sportsmen and I am sure all who hear me will agree that ability to bring game to the gun is a rare and worth while accomplishment.

Recapitulating, it is easily seen that a gamekeeper must be steeped in knowledge of nutrition and sanitation as applied to his particular problem; the natural history and habits of at least the commoner game species; the ways of vermin, winged and mammalian and, finally, the lore of the game cover.

With all this knowledge, however, he will not succeed unless his heart is at-

*The above are excerpts from an article entitled, "Our Main Dependence for More Game—the Gamekeeper" by E. A. Quarles, which appeared in *American Game* (Vol. 16, No. 1, p. 11.)

tuned to his work. The spirit that dominates him must rise superior to the wrack of days whose active hours makes a sweatshop worker's situation seem enviable by comparison were it not for the sheer fascination of the thing he is seeking to accomplish and the intimate contact with nature and her ways which is involved.

INSECT FOOD FOR YOUNG PHEASANTS.

Needed insect food for young pheasants has always been a problem. The following letter from Smith Riley suggests a unique method of artificially furnishing a supply:

Dr. H. C. Bryant,
Museum of Vertebrate Zoology,
Berkeley, California.

Dear Mr. Bryant:

I was much interested in your article about the Yountville Game Farm,* and the provision for plant culture in the bird yards in order to attract insects. I do not believe there is full appreciation of the importance of insect food in bird culture. It has always occurred to me that the insect and green food was of greater importance than all the prepared foods placed on the market, the recent preparations containing codliver oil not excepted though adding the oil has been a great step forward in chicken starters.

Somewhere here in the east there was a man who raised some ruffed grouse by feeding them each day a cricket or two which he caught by placing burlap sacks on the lawn.

Down in Alabama a man has been quite successful in raising the black field crickets which he has been selling for fish bait. It has occurred to me that crickets or grasshoppers might be raised for bird food. I understand that some experiments have been going forward at Cornell in the production of the eggs of fruit flys to be used in raising pheasants and grouse. To have a batch of young insects such as crickets or grasshoppers on hand when the young birds are sufficiently active to tie into them should be better than eggs as an all around food. One of the greatest grouse districts in the United States has been the sand hill region of Kansas and Nebraska where the nymph of those big lubber hoppers are just getting active when the hatching season occurs.

Not knowing much about crickets I collected a small cage of them late last summer and watched them through the fall and early winter, after securing what information I could about their habits and food requirements from Dr. Howard of the U. S. Dept. of Agriculture. My hens laid a multitude of eggs during September and all through October. Not being smart enough to realize the importance of moisture I lost my eggs by allowing the ground to dry out during the winter. If I had placed the boxes of soil in which the eggs were deposited in the ground so the rain and the snow would have kept the soil moist I should have had more small crickets this spring than some people have hay.

Dr. Howard tells me the enemies of crickets and grasshoppers are birds, small mammals, various predacious beetle larvæ, parasitic insects, mites and nemoades. He advises placing the foundation of a cage at least twelve inches in the ground and making the covering of 16 to 20 mesh wire cloth. A New York concern quoted me a price of $12.50 per roll of allweather metal cloth 18 inches by 100 feet or 150 square feet. I had thought of building an experimental cage ten feet long, four feet wide and four feet high using a 2x12 timber for the base and 2x2 or 2x4s for the frame above ground. Additional units of this size could be constructed if it was considered advisable to exend the experiment or carry out the activities with more than one kind of insect.

The crickets will pass the winter either as eggs in the ground or nymphs under what debris is offered for protection. the nymphs stand very much cold and if the cage is provided with bark and an abundance of old leaves, etc., it is very probable that even the smaller nymphs will live over winter. It would be well to put some small pieces of weathered logs in the bottom of the cage to provide satisfactory crevices in which the smaller nymphs can crawl for protection from the adult crickets. The crickets that over-winter as nymphs will mature in June and July. Those that hibernate as eggs will not mature until August or September. So with a sufficient number of breeding crickets on hand one should have a supply of young crickets of most any size which would be good food for birds of different ages, throughout the growing season.

Crickets are not necessarily grass feeders, but prefer dried organic material, dried grass, rotten wood, partially rotten rags and many other related types of organic food. I found that moisture is essential and that some animal food such as meat or fish meal is necessary to prevent cannibalism. I found that clumps of growing grass are very attractive to the crickets not so much as food but as shelter and they appeared to drink the moisture from the blades of grass when it was sprinkled. The cage should have sandy soil as the eggs are deposited in the ground. Some of my hens dug holes in the soil an inch or so in depth, and some thrust the oviduct into the soil without digging. Those making holes always filled them up after depositing the eggs. It was interesting to watch the hens carry gravel and place the particles over the location where he oviduct had been thrust into the soil to deposit the eggs.

It may be that you have some other kind of insect in California that would be more suitable for experiments of this kind than the black field cricket, or one of the more numerous grasshoppers. Both the crickets and some kinds of grasshoppers over-winter in this region in different forms as I have seen adult crickets and grasshoppers so early in the spring that they could not have been of the season's hatching.

I want to know if it will not be possible to carry out some insect culture experiments at one of your game farms looking to the production of a sufficient supply of insect food to successfully raise different kinds of game birds? To raise turkeys one must have insects and turkeys

*Bryant, H. C. 1926, California's new state game farm. Calif. Fish and Game, Vol. 12, No. 1 (Jan. 1926), pp. 10-13, 3 figs.

are the finest game birds of which the United States can boast. We have done little with turkeys and practically nothing with grouse.

Very sincerely yours,

(Signed) SMITH RILEY,
Box 204, Greenlawn, Long Island, N. Y.

PHEASANT SEASON DISAPPOINTING.

Hunters from Los Angeles, who made the trip into District 4½ for the pheasant season which opened on December 1st, returned with stories of many valley quail bagged. In plain words the 1926 season on pheasants was a disappointment to most of the hunters. On the opening day it is estimated that there were 200 nimrods in the field for ringnecks and the number of birds killed during the first two days of the season averaged approximately one-half bird per hunter. A liberal estimate would be 200 pheasants killed during this week, by far the greater number being taken near Bishop.

Approximately 100 hunters in Owens Valley during the first week in December were from Los Angeles and vicinity. The balance of the hunters were local people. Not more than eight limits of birds have been accounted for and many of the hunters failed to obtain a pheasant. Ninety per cent of the birds killed were of this season's hatch.

The fact that many of the large ranches in Owens Valley were closed to hunters and that very few hunters used dogs accounts for the small number of pheasants killed. Considerable protest was made by visiting hunters who were unable to hunt on posted lands where pheasants were reported abundant. Owners of ranches closed to hunting claimed their action justifiable on account of danger to stock. There is, however, a general sentiment among residents in Owens Valley in favor of a closed season on pheasants.

A NEW BOOK ON GAME BIRD PROPAGATION.

The pioneer pheasant propagator of Oregon, 'Gene M. Simpson of Corvallis, has just published a booklet of almost a hundred pages on "Pheasant Farming." Mr. Simpson has an enviable reputation and much experience as a raiser of game birds, especially the Chinese ring-neck, and this book has been put out to answer the many inquiries he receives concerning them. Amateur pheasant breeders will find it of value, for it goes into considerable detail on farm equipment; hatching, brooding and brooders; preparation of food for both growing and matured birds; their enemies; and the best methods of rearing pheasants in captivity, shipping birds and eggs, and liberation. Biologists agree with him in placing the rat and "semidomestic" cat under the ban, along with the sharp-shinned and Cooper hawks and the great horned owl, but may not subscribe to the traping and poisoning of the western red-tailed hawk and the common crow as advocated in this book, even though the latter is not protected in Oregon.

There are also chapters of general interest on the history of the propagation of pheasants and their habits both in confinement and in the wilds, on the Chinese pheasant as a game bird, and on the protection of the pheasant hen. One of the last two chapters of this book gives the details of Mr. Simpson's recent remarkable success in breeding the Hungarian partridge in captivity, and the other more briefly tells of the successful raising of the wild turkey. These notable feats of game bird raising were accomplished at the Eastern Oregon State Game Farm at Pendleton. Mr. Simpson is in charge of the three Oregon state game farms, at Pendleton, Eugene and Corvallis.

IMPORTATION OF QUAIL FROM MEXICO.

The season of 1926 proved the third largest for the entry of quail from northeastern Mexico since importations began in 1910. The total number imported was 37,134, of which 10,000 were entered at Eagle Pass, Texas, Between February 17 and 26; 1737 at Laredo between March 10 and April 24; and 25,397 at Brownsville between February 15 and April 24. As was the case last year, shipments were regulated through concessions granted by Mexican authorities, the entry of 10,000 being authorized at Eagle Pass, 10,000 at Laredo, and 50,000 at Brownsville.

Inspectors of the Bureau of Animal Industry examined all shipments at the border, but found no quail disease. Weekly reports were made on the condition of the birds and the details of the shipments, thus furnishing a complete check on the destination of entries. Nearly all were shipped to points south of Pennsylvania and the Ohio River, as follows: Texas, 5721; Oklahoma, 10,000; Kansas, 4969; Missouri, 515; Mississippi, 4980; Alabama, 4162; Georgia, 922; Kentucky, 3399; Maryland, 700. Of the northern states, Illinois received 662, New York 250, and other states 224. An interesting fact in connection with these importations

is that three of the principal states—Kansas, Oklahoma and Texas—that received Mexican quail furnished most of the stock for other regions twenty years ago, and in Oklahoma 1000 quail were reintroduced at a point from which some of the largest shipments were formerly made.

The number of quail imported from Mexico since shipment began in 1910 now aggregates about 266,000, nearly all of which were bob-whites. A few requests were received this season for entries of quail from other parts of Mexico, but because of the requirement that export permits must be obtained from the Mexican authorities before shipments are made, comparatively few birds crossed the border.

At the request of some of the game commissioners and other persons interested, the Tariff Commission during the summer of 1925 made an investigation of the cost of capture and shipment of Mexican quail, and as a result the import duty on bob-whites was reduced in October from 50 cents to 25 cents each. The experience of the past season indicates that this reduction had little, if any, appreciable effect in increasing the importations, since the number entered was less than in 1925, when 39,170 birds were entered subject to a duty of 50 cents each.—Annual Report, Chief of Bureau of Biological Survey, 1926.

EXPERIMENT WITH TROPICAL GAME BIRDS.

Attempts have been made during the past two years to introduce and acclimatize certain tropical game birds, including tinamous, curassows, ocellated turkeys, and chachalacas on Sapeloe Island, Georgia. The chachalacas are breeding freely in various parts of the island and the curassows are showing signs of a desire to breed. Experiments with other birds so far have been unsuccessful—Annual Report, Chief of Bureau of Biological Survey, 1926.

FIG. 25. Exhibit at annual Christmas party of Palo Alto merchants installed by the Palo Alto Rod and Gun Club with the cooperation of the California Fish and Game Commission. Deputy W. B. Sellmer arranged this effective exhibit.

PHEASANT FILLS NEED IN IOWA.

The state of Iowa presents an extreme example of the crowding out of wild animal life, once extremely abundant, by cultivation of the land. W. E. Albert, state game warden of Iowa, told the delegates at the National Game Conference in New York in December that even the small percentage of swamp and rugged land in that state had been made use of by farming and that there remains practically no wild cover for game.

This condition precludes the restoration of the native species to any extent, such as the prairie chicken, ruffed grouse, or even the local ducks, whose nesting places have been appropriated and drained.

In this juncture, says Mr. Albert, attention was directed to the pheasant, a foreign immigrant, which was introduced in limited numbers some fourteen years ago. The species is now firmly established, its greatest abundance being, paradoxically, in the most intensely cultivated sections of the state. Mr. Albert explains this by the assumption that in such sections there are fewer predatory animals than in the wilder sections to prey upon the pheasant.

Speaking of the prejudice that exists in some quarters against the pheasant as a destroyer of farm crops, this state official says he has found the evidence largely on the side of the bird. Instances are cited of complaints of pheasants pulling up newly sprouted corn. When pheasants suspected of this depredation were killed their crops were found filled with cutworms, the real corn-destroying culprits, and no sprouts of corn. Other noxious crop-destroying insects were identified in the stomach contents of the birds.

The pheasant does eat some grain, it is true, when insect life is not obtainable, which the farmer can well afford to permit in return for the services rendered during the summer when insect life is abundant and when the pheasant prefers the insect food in preference to anything else.

Mr. Albert also said that he has not been able to obtain any evidence that the pheasant crowds out any other species or is a disturbing factor to other game birds as quail and Hungarian partridge both thrive in suitable cover, along with the pheasant. The latter is most numerous where the pheasant is most abundant.

STATE REFUGES FOR WILD FOWL.

Several editorials and articles in current periodicals show that sentiment is more and more favoring a plan for state ownership of wild life refuges as a substitute for the proposed federal game refuges and public shooting grounds. One thing that has prevented activities by the state has been the lack of funds and of course the same thing has applied to the government.

Increasing sentiment in most states favoring an increased license fee is obviating this difficulty and California along with several other states is launching out on a plan to furnish wild fowl refuges in order to improve wild fowl shooting. The hunting seasons of the past three years have been so much below normal that every conservationist has been brought fully to the opinion that without food and cover, ducks can not be expected to stay within a state. California's extensive marshes have been drained and with the exception of the gun clubs, little marshland is available as attractive places for waterfowl. It hardly seems possible that the breeding stock has been seriously diminished, as there is much evidence to show that thousands of birds arrive early enough farther south at better feeding grounds. If the state will not only restore Lower Klamath Lake but also add numerous wild fowl refuges to its refuge systems, ducks are sure to again appear in numbers.

Already there are rumblings regarding the way in which a federal license fund might be expended. Eastern sportsmen will not wholeheartedly approve of spending large sums in the west which will do the eastern gunner no tangible good. An increased hunting license fee in California will provide funds, which through the years will assure a fine series of wild fowl refuges and the future of duck shooting will then be properly cared for without interference by the government.

CONFISCATION OF NET DECLARED LEGAL.

Superior Judge Fred A. Treat, of Monterey County, recently brought to a close one of the most important cases having to do with commercial fisheries when he declared the large purse seine owned by Andrew Zambarlin, deep sea fisherman, be forfeited as a nuisance, and ordered the California Fish and Game Commission to confiscate the net and sell it. The net is valued at $4,000, and the money realized by the commission from its sale will be turned into the fish and game preservation funds.

Zambarlin was one the purse seine operators employed by the Ocean Industries, Inc., a Nevada corporation, which undertook, early last winter, to operate a fish reduction plant, in violation of law, aboard the old concrete ship, *Peralta*.

WHAT DO SEA LIONS EAT?

The International Fisheries Commission was recently asked by fishermen of southern California to devise a scheme to rid the southern waters of sea lions, which they claim are killing off large numbers of fish.

The Fisheries Commission took the matter under advisement. Meanwhile

the Commercial Fisheries Department of the California Fish and Game Commission has begun an investigation to determine the food habits and economic relations of these sea mammals as a basis for future action. It is not known whether valuable food fish are taken in quantity. It is known that other food than fish is to be found in their diet. At present the sea lion is protected in the Santa Barbara Channel but given no protection in the north. Several years ago, the Oregon Fish and Game Commission, at the request of fishermen, hired a man to kill sea lions off the coast but did not gather data as to stomach contents nor were the thousand killed put to any use. The actual economic relations of these animals should certainly be studied before control measures are begun.

FIG. 26. King salmon caught by G. H. Clark at the mouth of the Klamath River, fall, 1926. Photographed by H. C. Roberts.

ARGENTINA PROHIBITS THE EXPORTATION OF TINAMOUS.

With unbounded satisfaction we learn from Dr. Roberto Dabbene of the National Museum at Buenos Aires that Argentina has passed a decree prohibiting the exportation of Tinamous. At intervals for the past three years Dr. Pearson and Dr. Chapman have been working to see this end accomplished. Various species of these partridge-like birds have been shipped from that country in cold storage to the port of New York to be sold as game. Of recent years this trade had grown to such proportions that a single shipment contained as many as 360,000 birds. While our laws prohibit the importation of the plumage of these and other wild birds when it is detached from the bird they do not prohibit its entrance when it is still part of the bird. We, therefore, have been powerless to prohibit the import of these birds into our country.

Argentina, at last, becoming alarmed by the growth of this trade and consequent decrease of the birds in that country, has fortunately taken the matter in her own hands. Realizing the value of her assets in game birds under adequate protection, she has now not only prohibited export at all times, but also their sale and transport in her own territory during the closed season. This action on the part of Argentina marks a notable step in the history of the conservation of wild life in South America.—*Bird Lore*, Vol. 28, No. 5.

COMPLETE YOUR FILE.

The supply of two issues of CALIFORNIA FISH AND GAME, volume 1, No. 1 (green cover) and volume 7, No. 1 (Salmon number) is entirely exhausted and several other numbers are so reduced that they can only be furnished libraries to complete sets. On the other hand, a sizable stock of certain other numbers, some of them as far back as volume 1, No. 2 and No. 3 has been located and these are available to those who wish to have a complete file. Now is the time to

discover your needs and fill them. If you will discover what numbers are missing, the Bureau of Education and Research will be glad to supply your needs in so far as it is possible from the stock now on hand. Delay will reduce your chances of securing needed numbers.

VARIETIES OF TUNNIES AND SWORD FISHES DESCRIBED.

Most descriptions of animal life are made from museum specimens, either stuffed or preserved in spirits. Scientists have found difficulty, however, in securing proper material on which to base descriptions when dealing with large forms, consequently, Dr. David Starr Jordan and Dr. Barton Warren Evermann in a joint paper* on giant mackerel-like fishes which range from 20 to 1400 pounds, have turned to photographs for museum material. After collecting a large series of photographs, the authors have given the first dependable list of species yet made available, although Zane Grey in his "Tales of Fishing Virgin Seas" has given many valuable records. A key to families and to species is given and a series of twenty plates illustrates the paper. Believing that many readers might be interested in the less technical write ups on several of the best known game fishes, we are reproducing them herein.

THE LEAPING TUNA, BLUEFIN.

"This is the 'leaping tuna' of the California coast, the most appreciated of our game fishes. It probably breeds in the open sea. The adult fishes abound among the Santa Barbara Islands, especially about Santa Catalina. Its northern limit is about the mouth of the Columbia River. (John Gill.) Its southern range extends well into Mexico. The largest tuna taken with hook and line at Santa Catalina weighed 251 pounds, but the species reaches nearly double that size. From the European tunny (*thynnus*) this California form differs mainly in the longer pectorals. It seems to be nearer the European species than the tunny of the Western Atlantic (*secundodorsalis*), if, indeed, all three are not forms of the same one, the variations due to defects of the artists rather than to peculiarities of the fish."

LONG-FINNED ALBACORE.

"The long-finned albacore is very abundant in Japan, Hawaii, and off the shores of southern California. It has the upper finlets yellowish, bordered around by black, the body a little more slender, and the snout a trifle more acute. The color of the finlets is more yellow than is recorded of the Atlantic form. The species is usually from 20 to 65 pounds in weight, the largest recorded from Santa Catalina being 65 pounds. The flesh of this species, contrary to our first impression (Jordan and Gilbert, 1880) is pale and of agreeable flavor. It has been for several years prepared as a condiment, in tin cans, in southern California, and sold under the name of tuna. Of late years the Oceanic Bonito or Aku (*Katsuwonus vagans* Lesson) has been thus prepared in Hawaii and southern California and in still greater abundance the leaping tuna (*Thunnus saliens*) and the yellow-fin albacores (*Neothunnus macropterus* and *N. catalinæ*) are now similarly treated."

YELLOWFIN TUNA.

"The species grows to a weight of 300 to 400 pounds; the one here figured weighed 157½ pounds. About Santa Catalina it is a valued game fish. Its southern range is not yet known; but between San Diego and Cape San Lucas it seems to give place to the tropical *Neothunnus macropterus*. Few or none of these large fishes, in their range, cross the Tropic of Cancer."

BARRED MARLIN.

"This species is very abundant in the deep seas about Hawaii, whence it is brought into the market every day, at least in the autumn season. The largest one seen by us weighed 780 pounds. It is also abundant about the Santa Barbara Islands where it is much sought as a game fish. The largest recorded from Santa Catalina weighed 339 pounds. Now that Japanese fishermen enter the deep sea, the species is well represented in the markets of all the larger cities from Japan. The original figure of this species from a mounted example (added to our published notes by Dr. Mitsukuri) must represent this species, although in form not quite like our examples. This is probably due to distortion, and our other references all must refer to this species."

BROADBILL SWORDFISH.

"This species is recorded from both sides of the Atlantic, on each of which it is an important food fish of excellent flavor. We have also examined photographs of examples from off southern California, especially about Santa Catalina Island, Hawaii and New Zealand. Ex-

*Jordan, David Starr and Evermann, Barton Warren, 1926. A review of the giant mackerel-like fishes, tunnies, spearfishes and swordfishes. California Academy of Sciences, Occasional Papers, Sept. 30, 1926, pp. 1-72, 20 pls.

amination of photographs fails to show any specific distictions from the excellent plate in Storer's Fishes of Massachusetts. Very slight difference in the length of the sword and that of the pectoral fin may be noted.

"The largest swordfish taken by an angler, of which we have record, was secured in the north Atlantic by Mr. Zane Grey. It weighed 578 pounds. The largest taken at Santa Catalina was obtained by Mr. Frank A. Gillespie in June, 1925, and weighed 571 pounds. This species is said to be very abundant off the coast of Lower California, especially northward."

It can be seen from these quotations that this review of the tunnies, spearfishes and swordfishes contains considerable material of interest to the angler, especially to the angler interested in sport fishing in the Santa Barbara Channel.

CANE GUN ILLEGAL IN CALIFORNIA.

Game Warden John Burke, of Daly City, was recently attracted by the strange actions of some man moving about in the brush. On approaching the man showed himself a violator by showing fight. The warden received several blows from a cane which had all the appearance of a malacca walking stick. However, when it was confiscated, it was found to be a cane-gun of French manufacture. When the tip of the cane was removed, a movement of the handle disclosed a trigger and the walking stick proved to be a typical cane-gun capable of firing a .410 caliber shotgun shell. This is the sort of weapon sometimes used by southern Europeans in securing protected song birds. It is considered a concealed type and inimicable to proper game protection. As a consequence, the violator when taken before Justice Ray Griffith was assigned a fine of $100 and the gun was confiscated.

AFRICAN CONSERVATIONISTS HAVE NEW TROUBLES.

American conservationists think they have trouble enough in attempting to deal with the depredations of the various species of game. Some states have endeavored to reimburse farmers for actual damage done but such trouble in connection with devastation of crops are of minor character as compared with the trouble met in the movement for African game protection as reported by Herbert Lang in *Natural History* (volume 24, pp. 313-28). Besides devastating crops, elephants by merely walking over wooden bridges cripple traffic and giraffes intercept communication by breaking telegraph wires. Zebras stampede through the strongest fencing and endanger both crops and domestic stock; rhinoceroses and buffalos become dangerous when gathered in herds.

Fig. 27. Songbirds killed by four Italians and confiscated by Deputy W. B. Sellmer at Blackpoint, Marin County. The collection contained everything from a humming bird to a quail. Violators pled guilty and were fined $600 by Judge Rudolff, of Novato.

DUCK DISEASE.

For several years past it has been evident that a large toll of ducks has been

taken by some strange disease, the exact cause of which has not been ascertained. The disease, in some instances, has been termed alkali poisoning and yet there is much evidence to show that in some places where large numbers of ducks have died some other cause was more potent. That the toll taken amounted to thousands of birds was evident from the reports that every investigator so far has made. The real extent of the inroad on the duck supply and the fact that the death toll appears to be increasing, has not been apparent to most sportsmen. That it is time to act and to make some effort to save a larger breeding stock of ducks has been made apparent by poor hunting conditions of recent years and has again drawn attention to the problem of the control of the devastating sickness which causes such great mortality.

In the *Saturday Evening Post* for February 19, 1927, Dr. E. W. Nelson, chief of the United States Biological Survey, reviews the whole situation and pictures the devastation around the alkali states of the west. The astonishing statement is made that losses in the Bear River marshes of Utah have run from 30,000 to more than 100,000 and that in worse years they have amounted to from one million to two million ducks in addition to numerous birds of other species, and that the total loss in the west since 1902 has probably reached 15,000,000 ducks.

Relative to western conditions he says:

The most imminent of all dangers now confronting our migratory wild fowl has developed in the states west of the Mississippi Valley. In this mainly arid region the water has disappeared from numberless lakes, ponds and marshes, covering thousands of square miles, through drainage, the diversion of water from streams for irrigation and a rapid evaporation, amounting to several feet a year in some areas, combined with a period of scanty rainfall extending over more than ten years.

These vanished water areas vary from small ponds and marshes to such large open waters as Goose Lake, lying across the border between Northeastern California and Oregon. Until within a few years this lake, about fifteen by forty miles in extent, covered an area of about 600 square miles, with its greatest depth about twenty-five feet. In October, 1926, its basin was a bed of alkaline dust, whirling up with the passing winds into stifling clouds. Tulare Lake, in the San Joaquin Valley of central California, once had more than 250 square miles of ideal wild-fowl marshes. Its bed is now dry and occupied by ranches. A little farther south, Buena Vista Lake, somewhat smaller but of similar character, also has gone dry.

In eastern Oregon a large number of lakes are known to have disappeared during the past few years. Malheur Lake, a large federal bird refuge in this state, long famous for the superb bird life breeding in it, has gradually decreased, until in October, 1926, it had only about one-tenth the water area existing the previous year and was only one twenty-fifth its original size. With another dry year it may disappear completely.

There is reason to believe that with the return of rainy years many basins now dry may fill again. A remarkable indication of this was in the discovery, when Goose Lake went dry, of an old well-marked wagon road crossing its bed from east to west. It is reported that the bed of the lake is of hard clay, which held these ancient ruts firmly until they were filled with a finer siltlike material. Local tradition and old records tell that this lake bed was dry and wagon trains of gold seekers and other emigrants crossed it here from 1849 to 1853. Subsequent abundant rains must have filled the basin and maintained the lake until the recent dry period which has revealed what might be called a fossil wagon road about seventy-five years old.

A return of wet seasons cannot be expected to restore the former conditions completely, for this region is being increasingly occupied by man, and many permanent changes have taken and are taking place, affecting its surface waters.

The general decrease in water areas in the Far West has forced a great concentration of wild fowl in those still remaining. At the same time, through evaporation, a concentration of alkaline contents in very many of these areas has rendered the water poisonous to the birds drinking it. This, possibly aided by some yet undiscovered disease resulting from overcrowding, has brought on an appalling mortality, not only among all wild ducks but to a lesser extent among geese. In addition, it has caused a great death rate among all the species of sandpiper, snipe and other waders, and herons, gulls, blackbirds, and practically all birds that frequent marshes. This so-called duck disease occurs in varying intensity during the summer or fall months every year, causing heavy losses each season and every few years becoming especially virulent and producing a frightful devastation in the bird life.

SCIENTIFIC DATA SECURED BY LION HUNTER BRUCE.

Not only is state lion hunter Bruce performing great service to conservation by reducing the number of mountain lions, and thus improving the deer supply, but he is at the same time increasing scientific knowledge regarding this large predatory animal. For several years, he has been taking careful measurements of every animal killed making careful weights, and thus making it possible for those interested in accuracy to discount the usual stories regarding the ten and twelve foot length of a mountain lion. It has been found that a skin can be stretched very readily to give a length of nine or ten feet, but actual measurements of recently killed animals bring the actual average length to around seven feet. Furthermore, Mr. Bruce has fur-

nished the Museum of Vertebrate Zoology at the University of California with as fine a series of skins as is to be found anywhere in the world. As a consequence, the scientists will always have useful scientific material on which to base judgments as to the characteristics of this largest member of the cat family found in the west.

STORM DAMAGE.

The storms of February not only overflowed levees, inundated farms and caused thousands of dolars damage to agricultural interests, but it swept away and severely damaged various racks used by the Department of Fish Culture in trapping fish for spawning.

At Shackleford Creek, Hornbrook, Bogus Creek, Camp Creek and other places contiguous to Mount Shasta Hatchery, a great deal of damage was caused by the heavy rains. At Hornbrook Station the cabin and personal effects of the man in charge were washed away. On the Klamath the water is said to have been higher than at any time since 1889-90. While the man at Shackleford Creek was reporting conditions over long distance phone to Captain G. H. Lambson, superintendent at Mount Shasta Hatchery, the waters carried away all bridges and he was forced to take a horse on his return trip. Fall Creek suffered little, although the water ran over the tanks. Beaver Creek also withstood the high waters with no loss of material.

The repair of the racks and traps will take $4,000. The damage will hamper spawning operations and probably reduce the take of eggs for the season.

AN INDIAN BRUSH DAM FOR THE TAKING OF FISH.

The accompanying photograph is of a dam built by the Pomo Indians of Potter Valley across the main Eel River. This dam is built entirely of brush across a riffle. On the side where the fish are taken a portion extends up stream some few feet forming a sort of pocket, the bottom of which is covered with white rocks so that a fish swimming over them is easily seen. A platform of logs is then built over the water to stand on and a stake driven into the ground on which is fastened a light. Usually this light is a pine torch in a wire basket or "torch jack."

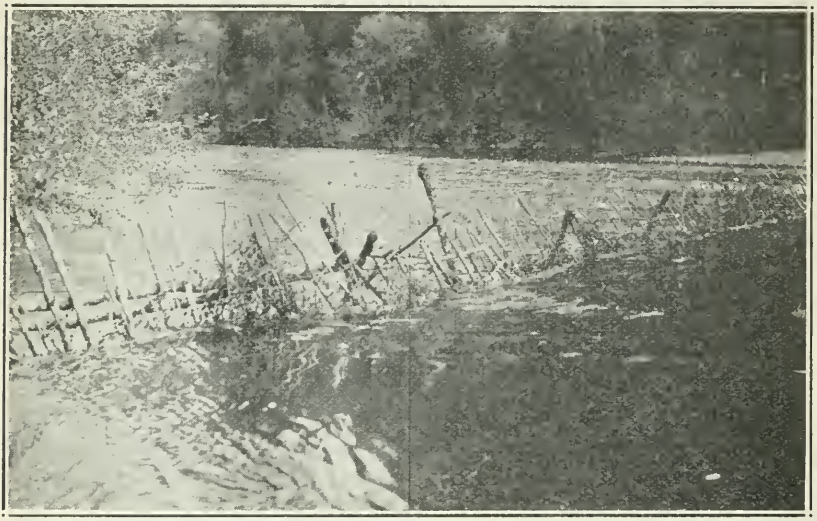


FIG. 28. Indian brush dam in Potter Valley. Typical of the old Indian method of securing winter food supply and also typical of an illegal method at the present time. Photograph by J. H. Hellard.

In years past the Indians would take their families, go out to the river, build a dam, stay by it for several days and catch large numbers of steelhead when they were running in the spring. This particular dam was across the river about two weeks before it was discovered. There has not been one like it built for several years as the practice is becoming obsolete. The construction was so good that no fish of any kind could get through and the

dams would remain until a freshet washed them out or some one removed them.—John H. Hellard.

THE VALUE OF WILD FOWL.

Mr. Manly S. Harris in an address to a group called to organize the United Duck Hunters of California held at the Clift Hotel, San Francisco, on January 6, 1927, emphasized the money value of ducks in the following words:

The monetary importance of duck shooting and all sports in California is many millions, in fact, every piece of property in California is more valuable with our streams, marshes and forests well stocked with fish and game, and every piece of property is worth less without it. Every year California is becoming more and more the winter resort of the American continent and every day more people of the east are carrying on with the hope of some day being able to live in our golden winter sunshine. Not the least of our attractions is, and should be, the open country, the field, forest, stream and marsh land. Most important of these, I believe, is the marsh. Here is our winter sport. It admits of definite location and action in preserve form and its open season is when the man of independent means is here on a holiday. Where is there one, who is man enough to gain a fortune, who is not red-blooded enough to want to go afield with gun in hand? You will be surprised to know that the capital invested in duck clubs north of the Tehachapi is estimated to be more than $21,000,000—a very important industry. You will be surprised to learn, also, that eighteen carloads of shells from eastern manufacturers, worth $1,800,000, were used in California last year, besides those manufactured here. Then, too, California sold 250,000 hunting licenses last year at $1 each. Now, allowing that every licensee owned only one gun, one that cost $50, would mean $12,000,000 invested in guns. Allowing that every licensee pays for boots, clothes, duck traps, raincoats, etc., $25 a season, which is a very low estimate, would mean $6,000,000 more. Automobile tires, gasoline, and railroad fares, we will leave out of account. Yet it is a tidy business, this duck shooting.

DEER INCREASING IN STANISLAUS FOREST.

When sportsmen read of the large number of deer killed in the Stanislaus National Forest in the successful effort to control the foot and mouth disease, it left little hope that many deer remained after the control measures were finished. It is good news, therefore, to get first hand information from Deputy Longeway and others that deer are being seen in increasing numbers within the area where so many deer were killed. Last season 150 unusually large bucks were secured, and it is the opinion of observers that there will be a quick replacement of the deer killed, provided the hunters' toll is not too heavy.

CLASSIFICATION OF VERMIN.

The report of a committee on "Classification of Vermin," was made by Dr. A. K. Fisher, chairman, at the Thirteenth National Game Conference. The report merely announced the general principles which should govern in deciding as to whether any species is more destructive than beneficial. The committee declared that it was impractical to make any "list" of destructive species that could be used for the country as a whole, as many factors of environment must be taken into consideration. Careful investigation must be made in each locality to determine the food habits of mammals and birds in that place to determine the ones that are injurious to game or other useful species. The problem therefore becomes a local one to be studied accordingly. Game farms and fish hatcheries are magnets which attract raptorial birds, destrucitve mammals and other species and at such places the list of injurious ones is much larger than in the open country where the food habits of some of the same species may be beneficial.—*American Game*, Vol. 16, No. 1, p. 9.

SURVEY OF DUCK CONDITIONS PLANNED.

Dr. E. W. Nelson, chief of the United States Biological Survey, has for sometime been calling attention to the need for better conservation of wild fowl and to the need for enlargement of marsh areas attractive to waterfowl. At his suggestion, California sportsmen have undertaken to raise a fund of $10,000 for the purpose of making engineer's surveys and estimates of cost for the reflooding and reconditioning of three marsh areas in the west: Lower Klamath Lake in northeastern California; Malheur Lake in Oregon, and the Bear River marshes on the great Salt Lake, Utah. Interest in this method of solving the difficult problem which now confronts the duck hunter in the west is increased because of the possibility of securing appropriations to handle these improvements if plans and cost estimates could be furnished Congress. When the situation is reviewed, a number of possibilities are apparent.

Lower Klamath Lake can be largely reflooded and the agriculture areas at the north end safe-guarded. Conditions at Malheur Lake could be improved by a series of artesian wells to furnish fresh water. The Bear River marshes can be improved by diking and thus restricting the flow of fresh water.

Earnestly setting themselves to the task, California sportsmen have designated state quotas for the eleven western states, and themselves are assuming one half of the entire amount. Remittances should be marked for "Western Duck Fund" and all of the moneys received are being deposited to the credit of the United States Department of Agriculture with the understanding that the funds will be used only for the survey plan.

WORSE THAN A CRIME—A MISTAKE.

Many of the mistakes of this generation may seem in their tragic consequences little less than criminal in the eyes of generations to come. Some mistakes permit of no remedy—the damage is irrecoverable.

As custodians of wild life our mistakes have been many. For in this complex world of ours, with its myriad unknown and interdependent forces, only omniscience can foresee the far-reaching effects of man's interference. At some expense we have learned caution in tampering with the delicate balance of our social structure. But we have not yet learned the need for the same caution when dealing with nature's balance in the world of the out-of-doors. Already here and there man has destroyed this balance utterly. He has over large areas profoundly modified it. But back in the hinterland of forest, field and woods a balance still exists that is well worth preserving.

Henry R. Carey pleads for maintaining this balance; for the necessity of withholding a destructive hand toward any kind of wild life until we know what the result of man's interference may be. It is a word of caution well taken. There is an insidious facility in recommending campaigns of extermination. Hawks have been found destructive to poultry? Destroy all hawks! Mountain lions kill live stock? Exterminate all mountain lions!

Nothing, apparently, could be simpler and yet nothing in the long run could probably be more inimical to our wild life.

"Not having omniscience," says Mr. Carey, "man can not experiment with living creatures as he can with chemicals in a test tube. If the chemistry experiment fails, more materials are at hand for a fresh attempt. But if the venture with a race is wiped out, all the test tubes in the world will not replace the complicated organism, itself a balance of nature's forces which was the work of ages of slow growth.

"Let us beware of flattering ourselves into a belief that because we have begun to understand and control electricity we can successfully guide the destinies of the living creatures of the world. That may come in the distant future but certainly not until we know much more about the nature of life itself."

So we may well pause amid these clamors of "Get rid of this—exterminate that" and confine ourselves to measures of local control until we learn a little more. Today we do not know enough to undertake safely any experiment of extermination, for many of the apparent villians in the wild life drama may yet have their necessary parts in nature's eternal economy. In terms of human happiness and human welfare the importance of our wild life increases as the years pass. We who today enjoy our brief loan of life on earth are not earth's last generation. Ours is a strict obligation, for in Mr. Carey's words, "We hold the wild life only in trust."—*American Forests and Forest Life*, Vol. 32, No. 394, p. 616.

A COMPARISON OF GAME CONDITIONS.

A comparison not odious but productive of thought can be made by comparing Pennsylvania and its game conditions with those in California. Pennsylvania issues more than a half million of resident hunting licenses, which is more than double the number issued in California. The legal kill of deer amounts to about one-fourth of that of California in spite of the greatly reduced amount of deer territory in Pennsylvania. Many sections now boast more deer than when white settlers first came. Estimates of the actual take of small game, such as rabbit and squirrel shows a healthy increase in average number of hunters in spite of an increasing number of licenses. This eastern state still includes wild turkeys in its list of game birds, but sportsmen are generally of the opinion that wild turkeys should be given actual protection for at least one year. During the open season of 1925, 470 black bears were killed in the state. There is no estimate of the kill of bears in California, so no com-

parison here is possible. That Pennsylvania is not a waterfowl state is evidenced by the estimate of 56,968 as being killed during the season of 1925.

A UNIFORMED PATROL FORCE.

Adoption of a "service suit" for all employees of the California Fish and Game Commission was one of the features of the second annual convention of that body. The "suit" is to be of light gray whipcord cloth, similar in style and cut to that worn by forest services and similar agencies..

The wearing of the service suit is to be voluntary, as there are many times in the field when the identity of men must be kept secret.

Men of the southern California patrol district are already in uniform, having adopted the service suit several months ago.

The principal arguments in favor of adoption of the suit were:

1. Increased respect for fish and game laws when enforced by a uniformed body.

2. Educational value of a uniformed force and elimination of complaints of lax vigilance on part of the wardens from persons unacquainted with them.

3. Giving the public the identity of these men to whom they may report violations of the law.

4. Elimination of the danger to deputies in civilian clothing when they are forced to stop autos on the highway for the purposes of inspection.

OPOSSUM DEPREDATIONS INCREASING.

Judging by newspaper reports the Virginia opossum, which was accidentally introduced into the state, is causing considerable trouble in poultry yards and rabbit hutches. A recent report is to the effect that one poultry rancher was losing his chickens regularly each night and thought that some human thief was responsible. When policemen were sent to watch the place, a fat opossum was apprehended making off with a large hen. Since the oppossum appears to prefer willows and underbrush along streams, depredations are most frequent in such vicinities.

While noting depredations to domestic stock, attention may well be called to the danger to wild birds and animals. The opossum is omnivorous, frequently depending upon fruit in season and yet pleased when birds or animals are available. Exactly how this interloper is going to affect our native fauna is yet to be determined, but certainly a watch should be set to determine depredations of this sort. The opossum is so prolific and has such a wide distribution in California that it is now too late to exterminate this dangerous species and resort will have to be made to methods of control.

THE REAL ENEMY.

No sportsman should overlook a chance to drive a nail in the coffin of pollution. Today this evil kills more game fish than are taken by all the sportsmen in all the states.

There is no possible reason why a factory or manufacturing plant of any description should turn its refuse into a public stream. No city or municipality has the slightest excuse to pollute and vilify public waters by filling them with municipal wastes. Most states have laws forbidding it, but still the practice goes on, for the penalties are usually not extreme and the influence working against a conviction is always strong.

Public sentiment can remedy both of these stumbling blocks.

An instance was called to our attention last summer of a stream near New York City in which the fishing had been very poor. The sportsmen felt that it would be necessary to stock it heavily to restore the sport of former years. It was common talk that it was fished out.

And then one day a dye plant turned some poisonous chemicals into this stream. Dead trout from fingerlings to battle-scarred warriors strewed the banks in countless numbers for miles. It was unbelievable that a stream that had furnished such poor fishing could contain such enormous quantities of brook trout.

A conviction was secured, although the manufacturing plant fought the case bitterly, insisting that the chemicals had been put into the stream through the error of a workman and against the strict orders of the management. A nominal fine was paid and the state is again stocking the stream in an effort to bring it back to its former productiveness. But it will be many years before fish can grow to real fighting size.

Damage of this nature is not confined to streams. Men interested in bathing last year put chemicals in a good bass lake not far from the stream mentioned above in an effort to kill the vegetation which was a nuisance on the bathing beach. The result was satisfactory so far as destroying the aquatic plants was concerned, but bass and other fish inhabiting these waters were also killed, and the banks strewn with dead fish.

Similar cases can be cited throughout the country; and unless more vigorous opposition is raised, thoughtless employees and corporations that are totally indifferent will continue to destroy fish wholesale.—*Field and Stream*, June 1926, p. 21.

THE RELATION OF FORESTS AND FORESTRY TO HUMAN WELFARE.

Forests are more than trees. They are rather land areas on which are associated various forms of plant and animal life. The forester must deal with all. Wild life is as essentially and legitimately a part of his care as are water, wood and forage. Forest administration should be planned with a view to realizing all possible benefits from the land areas handled. It should take account of their indirect value for recreation and health as well as their value for the production of salable material; and of their value for the production of meat, hides and furs of all kinds as well as for the production of wood and the protection of water supplies.

Unquestionably the working out of a program of wild life protection which will give due weight to all the interests affected is a delicate task. It is impossible to harmonize the difference between the economic, the aesthetic, the sporting and the commercial viewpoint. Nevertheless, the practical difficulties are not so great as they appear on the surface.—Henry S. Graves, former Chief Forester, U. S. Forest Service, *Recreation*, Vol. LII, p. 236, 1915.

MOUNT TAMALPAIS REFUGE.

To any thoughtful person it is quite apparent that the game refuge may sometimes be a refuge on paper. Whether it fulfills the purpose for which it is set aside depends upon several things.

First and foremost, it must furnish a suitable feeding and breeding place for birds or animals which it was designed to conserve. Second, it must have sufficient patrol to provide safety from poachers.

According to Deputy W. B. Sellmer, the Tamalpais Refuge which was created in 1917 is a real sanctuary for game. Deer, estimated at thousands, find safety within its boundaries. The best evidence of its efficiency is to be found in the fact that there has been a continuous increase in kill of deer along the edges of the refuge. About 400 deer were killed in neighboring territory during the 1926 season, and nearly 100 more at other places in Marin County. It is also reported that deer have actually been seen to take refuge within the boundaries when pursued during the hunting season.

Although there has been some complaint by the hunters that Richardson Bay, which was included in the Mount Tamalpais Refuge as a sanctuary for water fowl, has taken away too much available hunting ground, yet most people are pleased with the result. Commuters, riding back and forth to Mill Valley and other Marin County points, who take pride in seeing thousands of rafted ducks in the bay, are more numerous than the hunters who formerly used the area as a hunting ground. Therefore, from the standpoint of the number utilizing the birds the present situation is desirable.

RABBIT BOUNTY FAILS IN KANSAS.

It would be interesting to see a compilation of the instances in which bounties on various animals have failed to bring about the results expected and have, in many instances, depleted treasuries. Two outstanding examples which come to mind are the hawk bounties offered in Pennsylvania and the coyote bounty, which depleted the state treasury of California to such an extent that when the law was repealed, the state still owed $50,000 on the scalps of coyotes presented for bounty. A recent newspaper item states that the superior court in Kansas has ruled that western Kansas counties need not pay a five-cent bounty on the jackrabbit. The five-cent bounty has made serious inroads on the slim treasuries of sparsely populated Kansas counties and they refuse to longer pay the bounty. The superior court has ruled that bounties need not be paid when the general fund is insufficient. Here then is yet one more instance of the failure of such bounty laws. There still remains the recording of the failure of such a system to really accomplish the results in rabbit control claimed by its adherents.

CALIFORNIA QUAIL IN NEW ZEALAND.

In Canterbury, New Zealand, the California quail was introduced some thirty or forty years ago. It thrives well in those parts of the district where there is suitable food and where the rainfall does not exceed twenty-seven inches per year.—Edgar F. Stead, Christchurch, New Zealand.

DUCK DRIVES.

Duck drives on Sweetwater Lake in San Diego County are a fairly common thing. The net results, however, are not as desirable from the standpoint of toll taken as might be expected from the method used. A drive last fall which included thirty-eight boats netted at the

end, six ducks. As the flotilla of boats moves from one end of the lake to the other, the ducks get up, circle a few times and alight at the end of the lake which has just been left by the boatmen.

STRIPED BASS IN MARYLAND.

The striped bass number of CALIFORNIA FISH AND GAME apparently stirred the Maryland state game warden to discuss the striped bass situation in his own state. In the *Maryland Conservationist* (Volume 3, pp. 20-21) an article entitled "The Striped Bass of the Atlantic Coast" describes the successful introduction of this fish into California and gives the following interesting facts regarding the fish along the Atlantic coast.

"The striped bass does not cover great distances, or spend much of its life in the ocean. In Chesapeake Bay in Maryland it is our main food fish during 12 months of the year. When following streams in pursuit of spawning grounds, it is caught not only in salt or brackish water but also taken in fresh water at the heads of rivers. It is believed that in the late fall and winter the young fish, which have hatched out during the spring and summer, and which have reached a length of from three to five inches, abandon the shoal waters and seek the deeper water of the channels, and thence pass out into the ocean, where they start up and down the coast. The largest catches in Maryland waters are during the summer and early fall. After the cold weather sets in, the fish pass on to deeper water where they remain during the winter months.

The laws which are found on the statute books of the Atlantic Coast States are probably responsible for the striped bass being as plentiful as it is today, but the supply could be vastly increased by suitable protective measures. Speaking for Maryland, our laws are entirely inadequate. The spawning season being from April to July, it can be seen that the Maryland law, which provides that no striped bass weighing over 20 pounds may be taken during May and June, does not take care of the situation. No rock weighing over 15 pounds should be taken at any time of the year, as this size fish is one producing the spawn. Our laws further provide that no person shall take any striped bass under ten inches. The minimum size should certainly be increased to 18 inches.

The majority of striped bass taken on the Atlantic coast are by means of nets, which should be regulated by law, and during the spawning season, the fishermen should be compelled to raise their nets at least one-fourth of the period, thereby permitting the fish to reach their spawning grounds unmolested. The law should also provide that no net be fished during the spawning season with a mesh less than five inches. This regulation would also help the shad. The minimum and maximum sizes suggested should apply to the angler as well as to the commercial fishermen.

During the summer season of 1926, Maryland anglers have had excellent sport with striped bass, and fish ranging from one to 11 pounds have been taken by rod, hook and line. Most of the fish, known as the Huntington drone by trolling. The angler either by the use of a hand line or a salt water reel allows the drone to trail at a distance, and the deeper the water the more weight is used as a sinker. The Huntington drone is in the shape of a shoehorn, with a hook soldered to same. It is used without bait and is said to be very effective."

MIGRATORY WILD FOWL IN MEXICO.

Many conservationists and others have been urging the negotiation of treaties with Latin American countries for the protection of species of birds that winter south of the United States, similar to the migratory-bird treaty with Great Britain, which covers the protection of birds that migrate between the United States and Canada. In order to gather information on which diplomatic representations might be based, a biologist was sent to Mexico in January where he spent more than two months studying conditions on the principal wintering grounds of migratory waterfowl. It was learned that migratory game birds, especially ducks, spend the colder months in great numbers in the principal lakes and marshes as far south as the valley of Mexico, and that they are in urgent need of better protection, as they are decreasing in that section because of the slaughter for market that has been carried on with little restriction for many years. Mexican diplomatic and game officials have shown a desire to cooperate with the United States in game protection, and the matter is to be given further consideration.—Annual Report, Chief of Bureau of Biological Survey, 1926.

EASTERN BROOK TROUT PLANTED IN MORAINE LAKE, TULARE COUNTY.

Moraine Lake, as the name implies, lies between two lateral moraines in a beautiful setting of lodgepole pine and red fir, with the snowcapped Kaweahs in the distance. It is a shallow lake with neither inlet nor outlet. Its sandy beaches and warm water, for a lake of 9400 feet elevation, have made it a favorite camping place for parties who care to swim.

Several plants of trout taken from Chagoopa creek have been made, but, lacking a spawning ground, they have not increased and were soon caught out.

The demand of the angler was for a fish that would spawn in a land-locked lake and as the eastern brook seemed to be the fish best suited, a shipment was asked for.

On June 29, 1923, I received a shipment of eastern brook trout at Porterville, California. They were taken by auto to Camp Nelson, a distance of 35 miles. The cans were placed in the creek to change the water and rest the fish. At 1 p. m. they were loaded onto a pack mule and started for their future home.

Water was changed in the cans two miles out of camp. As the afternoon was hot on the summit, five miles from camp, a large bucket of snow was added to each can. The next stop was made at Little Kern, 16 miles from camp, where the water was again changed. At Trout Meadow the cans were placed in the creek for the night. This first lap of the trip was made in about six hours with the loss of only a few fish.

The following morning I left Trout Meadow at 5 o'clock, changed the water frequently, and arrived at Funston Camp on the Big Kern at 11 o'clock, where the cans were again placed in the river and allowed to rest until 5 o'clock the following morning. From here they were taken up onto the plateau to Moraine Lake, arriving at 8 o'clock and after tempering the water in the cans to even the temperature, as the water in Moraine Lake is warmer than river water, the fish were turned loose.

Only about fifty fish were lost on the entire trip from Porterville to the lake, a distance of about 80 miles, 45 of which was made with pack animal.

These fish seemed to adapt themselves very rapidly to their new home and with an abundance of food, they grew very rapidly.

On July 26, 1924, two fish were taken that measured eleven inches, and many other fish were seen.

On June 19, 1925, these fish had grown to 14 and 15 inches and showed evidence of spawning in the fall.

On July of this year I returned to the lake and was delighted to see several young fish about three inches long.

Although there were not as many fry as I had hoped to find I think that this fall's spawn will be heavier and stronger.

I hope the four remaining rainbow trout will be taken this summer, as this will eliminate the danger of their destroying the egg beds of the brook trout.

The adult brook trout now measure 16 inches and weigh over a pound, three years after the plant.—O. P. Brownlow, Porterville, California.

REINDEER INDUSTRY PROMISES TO BE IMPORTANT TO ALASKA.

The reindeer industry in Alaska promises to become an important factor in the future development of the territory, says the Biological Survey of the United States Department of Agriculture. It is comparatively a recent undertaking and as a commercial enterprise dates back only a few years. The original stock of 1280 animals imported from Siberia about 25 years ago has increased to about 350,000, distributed throughout the territory in 110 herds.

The rapidly growing industry requires that scientific studies be made for its best development, and under congressional authorization such studies were begun by the department in 1920 through the Biological Survey. Improved methods have been recommended to herd owners for handling reindeer and utilizing the range. A study of the range is now being made with a view to inaugurating a permanent system of grazing allotments. Careful and continuous inspection will be required to determine whether an area is being under or overgrazed.

One of the more fundamental of the problems studied has to do with the relation of lichens to grazing. Plans for future work contemplate studies chiefly along such lines as the development of interior ranges, conditions governing forage and range management, breed improvement of reindeer, and the control of the diseases and parasites to which the animals are subject. In view of the fact that conditions in Alaska are so different from those in the states as regards the kind of animal under consideration, the nature of the forage, and the climate, it is particularly important that thorough studies be made.

Full progress in the reindeer industry can come only from the adoption of better management methods, not only in range control and regulation, but in herd management and provisions for transporting and marketing the meat. This involves open herding, reduction of the proportion of bulls in the herds, selection of the best stock for breeding, infusion of new blood by cross-breeding with native caribou, adoption of improved methods of corralling and branding, keeping sled reindeer in each herd, and providing for herd ownership on the percentage basis for increases, with one registered brand for a community herd.

HEAVY WILD FOWL LOSSES RESULT OF REDUCED WATER AREAS.

Reduction in water areas in states west of the Mississippi is causing tremendous mortality among wild fowl, Dr. E. W. Nelson, chief of the United States Biological Survey said today (December 7) in an address before the National

Game Conference of the American Game Protective Association in the Hotel Pennsylvania, New York. There is crowding of birds in the remaining lakes and marshes, the water of which through evaporation and concentration of alkaline contents seems to become poisonous to the wild fowl, Doctor Nelson explained. He declared the marshes that are drying up could be flooded at moderate expense, and thus converted from death traps into healthy resorts for birds.

"The general symptoms of 'duck-sickness' are successive paralysis of the wings, legs, and necks of the birds, and the gradual development of a more or less comatose condition, followed by death. The development of these stages requires a period of several days. After the birds become helpless they may be gathered in great numbers, and when placed in an inclosure with fresh water nearly all recover in a few days and are able to fly away apparently entirely cured.

"Mr. D. H. Madsen, State Fish and Game Commissioner of Utah, estimates that in years when this 'sickness' is least prevalent in the Bear River marshes the losses there run from 30,000 up to more than 100,000, while during the worst years they amount to between one and two million ducks, in addition to numberless birds of other species. The number of ducks which have perished from this sickness in Utah, since 1902, and mainly within the last 15 years, probably exceeds 10,000,000, and with the toll taken by this or allied causes elsewhere in the west, makes a total loss exceeding 15,000,000 ducks, and probably an equal loss has been suffered by other birds.

"Mr. F. C. Lincoln, of the Biological Survey, who spent several weeks banding wild fowl in the Utah marshes during the summer of 1926, had an opportunity to make interesting observations concerning the 'duck-sickness.' On June 29 in passing through a narrow channel on the grounds of the new State Gun Club near the mouth of the Jordan River, he saw at least 300 dead ducks. He gathered 50 helpless ducks and after banding them transferred them to an inclosure with fresh water. Of this number 26 were pintails, 11 green-winged teals, 5 mallards, 4 cinnamon teals, 2 spoonbills, 1 gadwall, and 1 redhead. Near Duckville, on the Bear River marshes he found conditions vastly worse owing to the greater area involved.

"There one day he found 22 dead Canada geese, and captured four others which were helpless, but saved them by placing them in an inclosure with fresh water. In addition to vast numbers of ducks he found dead California gulls, great blue and snowy herons, avocets, black-necked stilts, sandpipers, Wilson phalaropes, glossy ibises, coots and yellow-headed blackbirds. In one area not over five feet square he counted eight recently dead ducks, and reports that the stench on this marsh from the decaying bodies of the ducks was almost overpowering. Owing to the vegetation on the marshes he could see only a limited number of the dead ducks and is confident that at that time tens of thousands of birds had already perished there, although his observations were made only at the beginning of the season and the most serious losses came later.

"Perfectly practicable ways are available to relieve the situation on a great scale. A visit to the Bear River marshes in October revealed to me the most gratifying fact that a very considerable quantity of fresh water is being discharged by Bear River through the marshes into Salt Lake and that by building dikes from 15 to 18 miles in length this can be held back to flood about 150 square miles of marsh. This will convert this area from a terrible death trap to bird life into a wonderful feeding and breeding ground for innumerable wild fowl. The Bear River Hunting Club has already diked and flooded about 8,000 acres of marsh lands in this district, and great numbers of waterfowl are rearing their young there each year. With these marshes converted into a healthy resort for the birds instead of becoming a ghastly death trap for them it would add tens of thousands of birds bred there each year to the supply and would give a resting and feeding ground for myriads of birds on their migrations north and south. The cost of this project would be about $300,000. Similar work is possible in other areas.

"In spite of the fact that the ducks of the states west of the 100th meridian have been greatly decreased through the terrible losses previously described, yet plenty of birds survive to bring back their numbers whenever the conditions are so changed that the birds will not be annually destroyed."

PAUL G. REDINGTON IS NAMED CHIEF OF BIOLOGICAL SURVEY.

Paul G. Redington, Assistant Chief of the Forest Service, in charge of the Branch of Public Relations, has been named by Secretary of Agriculture Jardine as Chief of the Bureau of Biological

Survey to succeed Dr. E. W. Nelson. The appointment will become effective May 9, according to the announcement made today.

Doctor Nelson has been associated with the work of the Department of Agriculture since 1890, and has been Chief of the Bureau of Biological Survey since 1916. During more than 50 years spent in the study of wild birds and animals he has accumulated a vast knowledge and experience. In order that he might devote his entire time to the assembling of information he has gathered and to round out his work in the field of science, he asked Secretary Jardine to relieve him of the executive responsibilities as chief of the bureau.

Before he began devoting his entire time to administrative work in the department Doctor Nelson spent more than twenty years as a scientific explorer in different parts of the continent from the Arctic to the Tropics. From the collection of birds and mammals obtained at this time he and others have described hundreds of species previously unknown to science. As a part of his Arctic experiences he was a member of the "Jeannette" search expedition in 1881 and was with the first party to land on Wrangell Island. His work on the customs and history of the Eskimos, made as a result of his study of these people while in Alaska in the 70s, is still an authoritative publication. In Mexico his travels during fourteen years extended into every state and territory of that country and resulted in securing large collections of specimens of mammals, birds, reptiles, and plants and in the accumulation of a vast amount of data, which he now expects to find time to prepare for publication.

His published work includes monographs of mammals and birds and descriptions of many new species. He is also the author of popular books and articles dealing with various phases of wild life and wild-life conservation.

During the ten years he has served as Chief of Biological Survey the bureau has developed and it is now generally recognized throughout the world as one of the leaders in the study of wild life and its conservation.

"Doctor Nelson has performed a valuable service to science and has made an enviable contribution to our knowledge of wild life," said Secretary Jardine in announcing this change in personnel. "In connection with one of Doctor Nelson's books on the 'Wild Animals of North America,' Theodore Roosevelt once said that the author was 'one of the keenest naturalists we have ever had and a man of singularly balanced development.' In recognition of his scientific work, both in the field and in the laboratory, a large number of species of various animals and plants have been named in honor of Doctor Nelson. It seems only proper that he should be relieved of the responsibility of administrative duties in order that he may turn his entire attention to bringing together the results of his experience and give more of his time to research studies. He will remain in the Bureau of Biological Survey as Senior Biologist."

"Mr. Redington has been connected with the Forest Service since 1904, and the lines of work on which he has been engaged both in Washington and in the field have been such as to well fit him for the various activities of the Biological Survey," said Secretary Jardine. "These activities include the conservation of the useful game and fur-bearing animals, game and insectivorous birds, and other beneficial or harmless forms of wild life and the control of those forms that are found to be injurious to agriculture, stock raising, horticulture, and forestry.

"Under the Biological Survey also are 72 bird and game reservations, and Mr. Redington's experience with wild life administration on national forests will be an asset both to him and to the Biological Survey in his new field of public service. Throughout his service over nearly the entire United States he has taken an active personal interest in wild life and its conservation. He has acquired his familiarity with our game birds and animals through his numerous contacts in outdoor life."

Mr. Redington has served the Forest Service in many western and southwestern states and in the headquarters at Washington. Following his appointment in 1904 he was assigned to work in Montana, Wyoming, and Idaho. Appointed forest inspector in 1906, he inspected timber sale work in Wyoming, Colorado, and Utah. In 1907 he was advanced to the position of inspector, and the following year was transferred to Colorado as associate district forester. From 1911 to 1916 he was supervisor of the Sierra National Forest in California, and from this position was promoted to district forester of the Southwestern District, with headquarters in New Mexico. Before returning to forestry work in California in 1919 he was city manager of Albuquerque for a term. For the next five years, as district forester of the California District, he administered the eighteen national forests of that State, and one year ago was promoted to assistant forester, with headquarters at Washington,

Mr. Redington is a native of Illinois. He was graduated from Dartmouth College in 1900, and during the years 1902 to 1904 took a post-graduate course in the Forestry School at Yale University, receiving the degree of Master of Forestry.

Mr. Redington will be assigned to the staff of the Biological Survey on February 16, spending the time prior to May 9 in becoming more familiar with the details of the bureau's work.

1926 FIRE RECORD FOR NATIONAL FORESTS OF CALIFORNIA.

A total of 1662 fires which burned over 584,601 acres and cost $565,136 to suppress is, in brief, the 1926 fire record for the national forests of California, according to figures released by S. B. Show, chief of the California district, United States forest service.

Of the total of 1662 fires that occurred in and adjacent to the federal forests, 1138 or 68 per cent were due to human carelessness—as compared with 537 out of a total of 1915 fires in 1925. Smokers led the list with 427 fires, with incendiaries 178, railroads 170, campers 137, lumbering operations 52, brush burners 50, and miscellaneous causes 124. Lightning is credited with starting 524 fires.

The total area of government timber and brush land burned over was 215,508 acres, while 369,094 acres of private lands within and adjacent to the national forests were swept by flames. The total cost to the forest service of fire suppression was $565,136, or more than double the expenditures made for like purposes in 1925.

Fires in the national forests this year killed 296,000,000 feet of federal owned timber besides large amounts of young growth, destroyed 750,000 feet of cut logs, and occasioned damage to logging equipment, mills and improvements amounting to $216,000—making a total loss, based on conservative estimates, amounting to nearly one million dollars, of which more than three-quarters of a million dollars were timber losses. Figures on additional losses of forage, wild life, water conservation and recreational resources are not available.

The leading fire forests were:

Shasta __329 fires, 85,542 acres burned
Plumas _181 fires, 30,988 acres burned
Klamath_161 fires, 111,412 acres burned
Sequoia _122 fires, 104,262 acres burned

The Angeles, Santa Barbara, San Bernardino and Cleveland national forests of southern California, long noted as the "tinder boxes" of the state, had only 147 fires that covered a total of 41,384 acres—an area less than that swept by the great San Gabriel fire of 1924, in the Angeles forest.

Smoking was prohibited on all national forests in southern California throughout the fire season, and, backed by similar ordinances in some counties, was rigidly enforced, with the result that of the 427 smokers' fires that occurred in the government forests of the state, only forty-six occurred in the southland. On the San Bernardino forest alone there were 108 convictions for violation of the smoking regulations, and the fines assessed totaled $2144. The no-smoking regulation was later extended to the northern forests until on September 1, over 15,000,000 acres of national forests in California were closed to smoking.

With the opening of the statewide hunting season on September 1, a large force of special registration guards was placed on the main roads leading into all national forests, and everyone entering the forests was required to register and was warned to be careful with fire. On the Modoc forest every automobile was required to be equipped with an ax and shovel, and on the Shasta forest every man in a hunting or camping party was required to provide himself with these fire fighting implements. The sportsmen's clubs of California gave able assistance to the forest service in the carrying out of registration and no-smoking orders by raising money for the hiring of guards.

By and large, the 1926 fire season on the national forests was a strenuous one and almost equal in intensity to the disastrous year of 1924. Because of the prolonged dry season, low humidity and hot winds, fires started easily and made spectacular runs. The Deetz fire on the Shasta forest, on cut-over land, ran 2000 acres the first afternoon, was controlled, but broke out again and ran 3000 acres the second day. On the Plumas forest, the Little Last Chance fire, in virgin timber and young reproduction, swept over 25,000 acres in three days. Many fires outside the national forests attained sizes of from 10,000 to 75,000 acres.

But, the forest service says, this is only half of the fire story—the state forester has yet to report fire losses in California outside the federal forests, and when these figures are made public the combined losses of forest resources should be such as to awaken every citizen to the tremendous seriousness of the yearly fire problem of the state.

FOREST CONSERVATION A NATIONAL OPPORTUNITY.

As long as conservation is a dominant factor in the perpetuation of the country's forests, the people of the United States must accept forestry as an opportunity as well as a responsibility, said E. A. Sherman, associate forester of the United States Forest Service, Washington, D. C., at a recent meeting of the American Forestry Association.

The fact that the dark side of forestry has been overdrawn, Mr. Sherman asserts, is largely the result of the magnitude of the task involved in the conservation and restoration of our forests. The evidence of the economic disaster confronting our nation has made forestry somewhat of a bugbear, notwithstanding the fact that the intelligent people of the United States now thoroughly understand and deplore the fact that 81,000,000 acres of forest land are idle, and that the United States is consuming each year four times as much timber as it grows.

"For long years past," declares the associate forester, "we have bewailed our wasted forests, our idle acres, our silent mills and abandoned towns, the rapid diminution of our remaining forest resources, the blindness and stupidity of our national carelessness with fire. We have preached the curse of wasted resources, blackened stumps, barren lands and economic damnation generally; but I want to urge that henceforth we preach the blessing of new and better forests, industries restored upon a permanent basis, and the landscape beautiful arising from the ashes of the landscape desolated.

"We must sell to our people the idea that beauty as well as the utility of our forests has a real value measurable in dollars and cents in that it makes the country more attractive for the habitation of man and adds materially to the sale value of every acre of land within the radius of its influence.

"Instead of bewailing the fact that it costs money to protect forests and plant new trees, and that all this expense might have been avoided, why not emphasize the fact that by expenditure of only a relatively small amount of money we can have cheaper and better homes, finer streams, better fishing and hunting, a more attractive landscape; and that by so providing forehandedly for the future we have demonstrated that as a nation we are self-supporting and permanent, and do not owe our commercial supremacy simply to the fortunate circumstance of rich resources accidentally inherited."

FACTS OF CURRENT INTEREST.

Although San Diego County is not considered an area to support many deer, yet a check of the deer killed the past season showed 136.

The crisis in fish and game administration hinging upon the success or failure to secure adequate funds for conservation work in California has occupied the interest of all lovers of the open from law makers down to humble hunters and fishermen.

At the January session of the State Legislature, 115 bills were introduced which were referred to the fish and game committees. To separate the good ones from the bad will take intensive study and keen insight.

During February the reports came in of deer dying in Mendocino and Humboldt counties from some mysterious disease. The Commission immediately dispatched a man to investigate.

Recent court decisions have checked the operation of floating reduction plants bent on turning food fish into fertilizer without limit or regulation.

Water poured over the top of the racks at the Klamathon Salmon Egg-collecting Station to a depth of four feet during the January storms. Fortunately the spawning season was over and losses were small. However, storms late in the spring caused $4000 worth of damage at various egg-collecting stations.

Following a decision made at the annual convention of employees the deputies will at their discretion wear a service suit of gray whipcord. The southern patrol has already appeared in uniform with very satisfactory results.

COMMISSION ACTIVITIES.

Department of Patrol.

Repeated search of markets in San Francisco during the duck season and the notably high price offered by duck bootleggers showed that deputies are curbing the work of market hunters and that fewer ducks are reaching the markets for illicit sale. Three market hunters apprehended at Stockton with 200 ducks were fined $450. The larger fines now accorded the violators are having a salutary effect.

During the month of December, 99 cases were taken into court, a small number compared with other months, and total fines of $3,495 imposed. Three men having in possession two pheasants were accorded a fine of $100 each by Judge Murdock. A dollar-a-year deputy arrested a shipyard worker in Oakland for dynamiting fish and the court assessed a fine of $200. An ahead-of-time duck shooter, whose first trial resulted in a disagreement, was taken into court a second time and assessed a fine of $150. Approximately 3500 licenses were checked by deputies during the month.

A new speed boat has been purchased and is being used on the lower Sacramento and San Joaquin. Headquarters for this boat have been established at Vallejo.

A review of cases shows:

A violator with six robins, a meadowlark and a killdeer in his possession was apprehended by Deputy Post, of Salinas. He pleaded guilty and was given a fine of $100 by Judge Ray Baugh, of Monterey.

Judge Fitzgerald, of Livermore, levied a fine of $50 to a violator accused of killing deer in closed season.

The killing of a dove in closed season cost A. J. Andrews $25 when taken before a judge by Deputy George Magladry.

Justice J. W. Shanklin, of Placerville, assessed a fine of $50 against two men caught with 60 pounds of deer meat in their possession during the closed season. Warden K. J. Ransdell, of Ukiah, made the arrest.

The killer of a pheasant apprehended by Deputy O. P. Brownlow, of Porterville, was fined $25 by Judge Lumley.

A Japanese caught with nongame birds and hunting without a license by Deputy Holladay was fined $75 by Judge Hoesch of Gilroy.

Deputy J. M. Hughes arrested Frank dePalma for killing nongame birds. He was assessed a fine of $150 by Judge Charles of Palo Alto.

During January a roundup of notorious market hunters was successful. One man was taken at 2 o'clock in the morning by wardens Shearin, Willard, Johnson and Sellmer, near Willows, while in the act of making a "big shot." He was taken before Justice L. P. Farnum, of Willows, where he was assessed a total sentence of 225 days. The court decided that use of the "Long Tom," or extension automatic shotgun used by the hunter was good for 100 days; that night shooting was good for an equal sentence and that 25 days additional would be about right for having over the legal limit of birds. The wardens found 100 birds on the ground after the market hunter's big gun had ceased firing.

Justice C. S. Johnson, of Stockton, assessed a fine of $150 each upon three parties taken in that city by police officers R. E. McHugh and Tom Long, with 200 wild ducks in their possession. Before paying the fine, the three violators told the court they were engaged in running a gun club near Willows, had killed the ducks the night before their arrest and were transporting them to San Francisco.

Two violators shooting from motor boats taken by Warden Ed Glidden, of San Diego, were fined $75 by the local justice. Still another was fined $50 for a similar offense.

Department of Fish Culture.

On January 20, 1927, a fresh supply of eastern brook trout eggs was received from the Pennsylvania Fish and Game Commission. Packing cases of special design furnished by the California Fish and Game Commission were used in making the shipment and the eggs arrived in better condition than any previous shipment.

At the end of January a total of 4,905,000 salmon eggs and fry and 8,307,000 trout eggs and fry were at the Mount Shasta Hatchery.

The installation of the refrigeration plant at the Mount Shasta Hatchery has been completed. Eighteen tons of ice has been made and stored. The ice-making machinery is automatic and within a short time, the storage room will be full.

Extensive repairs to racks and traps were made necessary early this spring by the unprecedented rainfall. High water has interfered with the take of eggs at most of the egg-collecting stations.

Over 100,000 steelhead trout fingerlings were liberated in a Santa Cruz County stream from the Brookdale Hatchery in February. About 149,500 steelhead eggs had been gathered up to January 31.

The work of construction on the Yosemite Hatchery is nearly completed. The troughs were installed during the month and the painting and finishing up of the interior is well underway. The settling tank is completed and connections to the main building will soon be made. There are two rooms planned for office and feed room that can be used temporarily for living quarters for the foreman and a small building that was used by the constructive foreman can be moved back a short distance and used by the assistant as living quarters until more commodious quarters can be furnished the help.

Work on Big Creek Hatchery has been delayed, owing to the stormy weather and a misunderstanding regarding the material to be used for the hatchery troughs. We are planning to place the first eggs collected at Scott Creek in the Brookdale Hatchery and when eyed ship them out to other stations, so as to have the last of the eggs collected eyed at Brookdale and sent to Big Creek when the hatchery is completed. The troughs as first made had to be rejected, but the construction of the new troughs will be rushed and the manufacturer has promised to make an early delivery.

The Board of Public Works, after a close study, estimate there will be approximately $1,200 left after the hatchery is completed. They also estimate there will be approximately $5,000 left after the Yosemite Hatchery is completed. The aquariums are not built, but the room is ready to have the aquariums installed when the funds are available for that purpose. It will be advisable to use the surplus money left over after the completion of the Big Creek and Yosemite hatcheries to erect cottages for the help

FIG. 29. The new Yosemite hatchery baptized by snow, February 27. Construction began last fall and was completed during March. Photograph by George Magladry.

at Big Creek, where living quarters are necessary. During the coming summer the aquariums can be installed at the Yosemite Hatchery.

During January, Mr. Coleman made a biological survey of Salton Sea at the request of the Brawley Chamber of Commerce. He found the only fish of commercial value in this body of water is the so-called mullet. There are some sunfish, perch, also a species of the large minnow known as the western pike. The water is alkaline and experiments should be carried on this season to determine whether some good food and game fishes will thrive in the waters of Salton Sea.

It is probable that some species of bass or catfish will do well in this body of water, but another investigation and analysis of the water should be made later in the season, so that all conditions will be understood before introducing any more species of fishes. This survey can be continued at intervals during the coming season in conjunction with other biological investigations.

Twelve thousand eastern brook eggs were secured last fall at Gull Lake in Mono County by seining the fish. The new spawning station at June Lake also furnished a very fine take of steelhead eggs.

Department of Commercial Fisheries.

The Division of Scientific Inquiry of the U. S. Bureau of Fisheries is adopting California's scientific program and is advising other states to follow the example of California. Elmer Higgins, in charge of the division, and O. E. Sette, in charge of the Division of Fishery Methods and Statistics, were both trained at the State Fisheries Laboratory.

The director of the Department of Commercial Fisheries attended a meeting called by the U. S. Bureau of Fisheries in Washington, D. C., where he read a paper on "The Problems of a Fishery Administrator" and joined in the discussion at a meeting of the Scientific Advisory Committee. In December the director also attended a meeting of the International Salmon Investigation Federation at Seattle. The Federation decided to appoint a subcommittee to report back at the next meeting on the efficiency of the different types of fishways and elevators thus far devised for solving the problem of lifting salmon over high dams. At the same time they adopted resolutions calling attention to the fact that in spite of publicity, the problem is far from being solved.

State Fisheries Laboratory.

Analyses of the boat catch of striped bass, salmon and shad have been prepared and are ready for use by the legislative committees, which will have to deal with proposed legislation. Some work on price fluctuations for these fish has also been done. A correlation with rainfall and the catch, so far as the Sacramento river is concerned, apparently has been discovered. If such a relationship exists, it possibly is due to fish avoiding gill nets in clear water when the river is low.

A manuscript covering the gear and fishing methods used by the sardine industry on Monterey Bay has been prepared and is ready for the printer. It will be issued in the fish bulletin series.

Each research worker at the laboratory is urged to make four trips a year on a commercial fishing boat so that first hand experience may be a guide in assembling data. Such personal observation of fishing conditions is considered necessary to satisfactory work.

The members of the staff meet weekly for a Journal Club. Current technical papers are reviewed and discussion of pertinent problems fills the remaining time.

Progress on the barracuda investigation is being made. A bibliography of literature has been prepared and age studies by means of scales have been attempted. Sampling has given material for studies on weight and rate of growth.

A series of photographs showing all of the fishes of commercial value is being made. Eventually the series should cover all of the northern and southern fishes.

The annual cross-sections of the Pismo-Oceano Beach to provide a census of Pismo clams was completed last November. The number of clams of each age class are counted on selected sections of the beach. A comparison of the results for the past four years is being prepared.

Bureau of Hydraulics.

Many inspections of screens and ladders have been made and several cases of pollution cleaned up. The attempt continues to get up-to-date data on every screen and ladder in the state.

Installation of the screen on the Prattville outlet of Lake Almanor, leading to the hydro-electric plant of the Great Western Power Company near that place, has been completed, according to a recent letter accompanied by photographs, from Ernest E. Behr, comptroller of the power company.

Screening of the power company's outlet from the lake was made necessary by the fact that large numbers of fish from the lake were declared by sportsmen to have been drawn out through the tunnel and into the turbines. Arrangements for the installation followed a series of conferences between leading sportsmen and power company officials, held in the San Francisco offices of the Commission early last fall. Waters taken out at this point are conveyed through a tunnel between three and four miles in length into Buck Reservoir, and finally into the plant at Caribou.

Stream pollution conditions in Ventura County have been greatly remedied in recent weeks. A new salt water line from the fields in the Ventura river valley has been completed and an agreement has been reached with the Petroleum Securities Corporation under which that concern states its willingness to guard against further pollution, and has promised new safeguard work toward that end to be completed by March 1.

In the Hopper canyon section, the Julian Petroleum Corporation has advised that all operations have ceased and that complete protection against further pollution of that stream will be installed before work is begun again.

A new waste oil and water line in the Signal Hill fields, where pollution was rampant up to a few months ago, has been reported as completed. Through use of this line all offending companies are now carrying their wastes out of the natural waterways and into a sump where much of the refuse is reclaimed and the rest of it burned. It was at this point that the commission, after an exhaustive investigation, was forced to start action against twenty-one oil producing concerns in order to clean up a condition long complained of by citizens of Long Beach.

Huntington Beach, where considerable oil pollution is known to exist, is next in order, and greatly improved conditions will be demanded at that point.

Bureau of Education and Research.

A display rack in the main office has been provided with various maps showing game refuges, patrol districts, etc., and with displays of photographs showing the state game farm and summer resort educational activities. A fine series of colored plates helps in distinguishing the various hawks and indicates the economic value. One leaf of the rack displays the various series of publications issued by the commission.

On Janury 3, 1927, the office of the Bureau of Education and Research was moved from the Museum of Vertebrate Zoology, Berkeley, to rooms 710-713 in the Postal Telegraph Building, San Francisco. With additional floor space, better equipment and better coordination with other departments, it is expected that the bureau will function more efficiently.

An outline of a course on "Natural Resources of California" useful in public schools, has been prepared and furnished Fort Bragg schools where it is being utilized in the fifth to the eighth grades. Should this trial in Mendocino County schools prove satisfactory, the outline will be made available to all teachers desiring to have it. The outline has material for discussion in class room work, bearing on soil, mines and mining, forests, fish and game. Below each main heading is listed the organization concerned in conserving the resource and lists of books and pamphlets useful as references.

A new film entitled "California Fish and Game" has been prepared which gives glimpses of the principal fishes, game birds and mammals of the state, including trout, salmon, valley fishes, wild pigeon, grouse, deer and elk. This film is now available for use by schools and other organizations with proper projecting apparatus.

Bureau of Statistics and Game Problems.

An anti-venison serum has been prepared and is now ready for use. It will detect deer meat as against any other kind of meat in a dilution of one to one hundred thousand. When meat supposed to be venison is confiscated by a game warden, he may now send it in for test. Often, a violator claims his venison is goat meat or mutton. The use of this scientifically accurate test will be useful in future cases when sure identification of deer meat is involved.

A conference was recently held at the Hooper Foundation for Medical Research for the purpose of discussing the possibility of introducing dangerous diseases which exotic game birds might harbor. It was pointed out that the danger lies in the spread of diseases which may develop on the state game farm when domestically reared pheasants are planted since no introduction of foreign birds are contemplated. Precautions are being taken to avoid danger from this source by making post mortems of all birds which die at the farm, by testing all foster mothers for tuberculosis and other disease, and by sanitary measures to assure pure food and drinking water.

Bureau of Game Farms.

The early months of the year found the breeding pens at the game farm filled with greens: alfalfa, wheat and kale. This splendid growth of green feed should assure fine egg production and high fertility.

There is found elsewhere in this issue, an article on game bird farming prepared to stimulate interest in furnishing more and better birds for the fields. It is based on the results of practical experience and should answer the many questions put by the amateur game farmer.

The pens left uncompleted last season have been piped, plowed and otherwise conditioned for use this spring. Alleyways have been graded and graveled. From both the standpoint of utility and appearance the game farm has been greatly improved during winter months.

Bureau of Public Relations.

The Service Bulletin issued by this bureau is bringing needed coordination of the working force of the Commission. In addition to items for the betterment of service, the monthly issues carry personals which are informative and help weld the organization into a friendly group of workers.

A review of the items printed by newspapers show that they are interested in using stories relating to arrests and convictions. Eight such stories were issued during December and many since. More will appear in the future as contact has been made with editors in whose papers the publicity items issued by the Commission have not appeared.

The director of the bureau has been active in addressing service clubs and fish and game protective associations throughout the state. All give a listening ear to the activities and plans of the Commission which forms the topic of discussion.

On January 7 and 8 a cabinet meeting was called to discuss proposed legislation and at the same time to consider the report of the Fish and Game Study Committee of the California Development Association. With but few exceptions the report of the committee met with the approval of Commission department heads. Plans were laid for satisfactorily handling the new program of fish planting.

COMMERCIAL FISHERY NOTES.

N. B. Scofield, Editor.

THE OCCURRENCE OF THE JAPANESE HERRING.

The Japanese herring, *Etrumeus Micropus*, is rarely found at the San Pedro fish markets. Elmer Higgins has reported finding this species at the markets on three separate occasions, November, 1919, July, 1920, and June, 1921. Another specimen of this species was found at the markets on February 3, 1927. It had a total length of 35 centimeters and a body length of 29.5 centimeters.—Carl R. Jackson.

WANTED: HOOKS FOUND IN ALBACORE AND TUNAS.

Hooks found in tunas and tuna-like fishes are valuable scientific evidence of the habits and migrations of these species. All persons discovering them are urged to send hooks and other objects found in the bodies of tunas to the California State Fisheries Laboratory, Terminal, California. (Expense for postage will be refunded.) The specimens sent in should be labeled with the common name of the fish, the date and place of capture, the name of the finder, and the approximate length of the fish (tail fin included).

The tunas are wanderers of the sea. They are supposed to range widely over great ocean areas, but the limits of migration in particular species are not known. In most cases it is unknown even whether fish inhabiting different localities, but bearing the same names, are really identical in structure and habits.

Tagging has not seemed as practicable a method of investigating the migrations of tuna, as it has for some other fish. Therefore, Dr. Massimo Sella, of the Royal Italian Oceanographic Committee, has suggested collecting the hooks occasionally found in the mouths and stomachs of tuna, which may have been carried by the fish from far distant grounds, and trying to find out where these hooks came from. As Dr. Sella says: "It is not such a rare event to find a hook in tuna, though it may not happen every day, and every one so found is a precious bit of evidence—a kind of ticket which comes attached to this submarine voyager." By this means preliminary results have already been obtained in Europe. In tunas captured in the central part of the Mediterranean, hooks have been found coming from both eastern and western ends of this sea, and from the Atlantic coasts of Spain and France. Dr. Sella interprets this as evidence that there is no racial difference between the tuna of the Mediterranean and that of the Atlantic seaboard of Europe. It will be very interesting to obtain evidence of the Pacific migrations of the tunas.—R. M. T.

SAN DIEGO'S LOBSTER CATCH EXCEEDS THAT OF 1926.

On February 6, C. F. Maddox of the San Diego office of the State Fish and Game Commission announced that the San Diego fishermen had already caught more lobsters than were caught during the entire season last year; 805,522 pounds so far this year as against 729,141 pounds last year. As the California lobster season did not close until February 22, and the Mexican season not until March 15, last year's record had evidently been left far behind, as huge catches were still being brought in.

Senor Jose Leon of the Mexican Fisheries Department will recommend that next year the Mexican lobster season open and close on the same date as the California season.

During January nearly one million and a half pounds of fish were brought to port by the San Diego fishing fleet. The sardine catch of 438,499 pounds did not equal that of December, nor of January, 1926. The complete catch of sea food was 1,417,101 pounds, practically one-third of this amount consisting of sardines.

The largest single haul of sardines was made during January at San Pedro by the Franco-Italian Packing Company's launch. The catch of 265 tons of sardines in one giant net is the largest single catch recorded for California, and probably for the American waters.

ALBACORE CAUGHT NEAR MONTEREY.

For the second consecutive year albacore have been caught near Monterey in abundance sufficient to warrant interest. Last year was the first time in many years that albacore had been noticed and a great deal of excitement among the fishermen of San Francisco and Monterey resulted over the prospects of the development of a new fishing industry. Albacore appeared off Point Sur and near-by regions last year about Septem-

ber 5, according to the notes of W. A. Selle, and were caught throughout the month and for some time following. This year they appeared in the same region late in October, and have continued to be caught intermittently throughout November and the first few days of December. No catches have been reported as being caught in Monterey Bay. Two boats delivered small catches at Santa Cruz during the early part of November, but the location of the fishing grounds could not be learned. The Point Sur region is the location of a large amount of market fishing.

The best catches were made during the first and second days of November when weather conditions were better than at any time since. On those two days the total receipts for the Monterey markets were approximately twelve thousand and thirteen thousand pounds, respectively. For the remainder of the month the catches varied greatly and there were twelve days during the month that no albacore were taken. Fairly good catches were brought in during the last three days of November. Still there is no assurance that the "temperamental tuna" will remain in this vicinity for long.

A total amount of 29,566 pounds of albacore was delivered to the Monterey markets during November out of a total take of over 62,000 pounds. The market price is ten cents per pound so that even though the appearance in this region is short, it is, nevertheless, of considerable importance to the forty or fifty fishermen that have been bringing in catches. These same fishermen spent the spring and summer months in San Pedro attempting to catch albacore, but the season there was below normal.

The gear that is being used is the ordinary market fisherman's boat equipped with jig poles and jigs which most of the fishermen carry with them. Individual boat catches range from a few pounds to well above seven hundred pounds and a goodly number range about five hundred pounds when fishing is good. —C. B. Andrews, December 16, 1926.

VISITORS.

Visitors to the State Fisheries Laboratory during the last few months have been even more than usually numerous and interesting. Just before Christmas, Mr. W. F. Thompson, formerly in charge of the laboratory and now director of investigations for the International Fisheries Commission, United States and Canada, spent about ten days here, going over the programs of work outlined by the various staff members and joining in our conferences.

C. B. Andrews, engaged in sardine work for us at the Hopkins Marine Station, W. C. Herrington, who is attending Stanford University, and S. S. Whitehead, who is making scientific observations at San Diego, also spent several days here during December.

We likewise renewed cordial relations with our former staff members, W. C. Van Deventer, now studying medicine at the San Francisco Hospital, and W. A. Selle, who is instructor in physiology at the Santa Barbara State Teachers College. Paul Bonnot of the San Francisco office stopped for a few days' study in connection with his assignment to work on the seals and whales of the coast.

During nearly the whole of January, E. C. Scofield made use of the laboratory's facilities for his work on the life history of the striped bass. A progress report of his investigations was presented to the assembled scientific staff.

In addition to employees of the Fish and Game Commission, a number of others have paid us calls. G. A. Rounsefell, who is working for the U. S. Bureau of Fisheries on the Alaska herring, spent several days of his honeymoon here, reading recent papers on herring research. He also presented a report of his work to one of our weekly evening "Journal Club" meetings. Dr. Willis H. Rich, director of the International Pacific Salmon Investigations Federation, gave us a Saturday afternoon on his way back to Stanford University from Washington, D. C., where he had attended the conference of the division of Scientific Inquiry of the U. S. Bureau of Fisheries, called late in December. Also fresh from this conference, N. B. Scofield, head of our Commercial Fisheries Department, gave us an interesting review of the speeches and events which characterized the Washington gathering.

Other notable visitors have been Mr. Lewis of the Scripps Institution of Oceanography, whose work on the food of the sardine looks forward to results that may perhaps be correlated with some of the work done here on this species; R. S. Fellers, who is studying chemical problems connected with the sardine packing industry at the laboratory recently set up in the Wilmington cannery of the Coast Fishing Company; O. W. Lang, of the Hooper Foundation for Medical Research, who is also interested in chemical and bacteriological investigations on canned fish; Florencio Talavera, a Philippine government zoology student, and

Mr. Parks of the American Can Company. All of these people, as well as the staff members of the International Fisheries Commission (United States and Mexico), have called on the Laboratory Library for some service, large or small, and it is gratifying to find them very appreciative of such help as we can give. They, in turn, have contributed to broadening our outlook on fisheries investigations in general, and have often put us in touch with information of much value.

RUTH THOMPSON, Librarian.

CALIFORNIA SARDINE INVESTIGATIONS.

Being a Review of Fish Bulletin No. 11, "The California Sardine."*

By RUTH MILLER THOMPSON, Librarian, California State Fisheries Laboratory.

Fish Bulletin No. 11, recently issued by the California Fish and Game Commission under the title, "The California Sardine," is exciting considerable interest because several features of the general sardine investigation program, to which this is the first extensive printed contribution, are almost unique in American fisheries research. It contains five papers, which present the results of work carried on by the staff of the California State Fisheries Laboratory from 1919 to 1923, under the direction of Will F. Thompson, now in charge of investigations on the North Pacific halibut for the International Fisheries Commission. The publication of this research has been delayed, due to the fact that while the papers were still in preparation their authors, with but one exception, left the state's employ. Each article in the bulletin details a separate special study on some limited phase of the sardine problem; yet the fact that clearly defined aims were ever present in the minds of all contributors, has resulted throughout in a real unity of spirit. The plan of research was comprehensive and well reasoned; every part of it is an organic part. There is as much significance in the fact that certain avenues of attack usually emphasized in fishery work are intentionally omitted or their use postponed, as there is in the fact that certain other approaches are assiduously followed.

The fish in the waters of any state are the property, not of the federal government, nor of any individual commercial interests, but of the state itself. The state's agents are therefore in duty bound to insist: (1) that the use without waste of as much fish as can be caught each year without endangering the permanent supply, be encouraged; (2) that any use of fish which threatens depletion of a species be rigorously prevented. But conservation officers can not insist on these two fundamentals unless they have reliable knowledge of the fish supply.

If they have no rational basis for the legislation they favor, how can they be sure of its effects? Definite knowledge of the supply of fish is not easily gained; mere experience in any branch of the fishing "game" does not provide it. It can only be secured by well-planned scientific research prosecuted continuously and consistently over a considerable period of years. Under these circumstances, scientific conservation research that receives state support may well be concentrated on studies of supply. All work, however interesting and valuable, which does not aim first to describe what variations in abundance actually occur, and then to determine whether the causes for these variations are natural conditions or overfishing, is, from the point of view of the welfare of a particular species or fishery, and therefore from the point of view of the state, undoubtedly of secondary importance.

These are the ideas which form the background of California's sardine investigation program, and which have protected the state from expending large sums on merely incidental researches only indirectly related to the state's own major interests.

In the introductory paper of the series, entitled "The California Sardine and the Study of the Available Supply," Will F. Thompson shows the importance of the sardine fishery as compared with California fisheries for other species, and justifies the adoption of the type of investigatory program followed. A careful comparison of the structural peculiarities of California and European sardines reveals that the two types are sufficiently alike so that methods of investigation applied to one may be expected to yield worthwhile results when applied to the other, but sufficiently different so that it is unsafe to assume anything but a very general similarity as to habits and details of life history.

Mr. Thompson discusses the distribution of sardines along the Pacific Coast, as to amount used and sizes present, but

*Two thousand copies of the Sardine Bulletin were printed; some are still available for distribution from the California State Fisheries Laboratory, Terminal Island, California. Shorter articles about the history and methods of the sardine fishery in California appeared in the "Sardine number" of CALIFORNIA FISH AND GAME (Vol. VII, No. 4). This edition is now practically exhausted.

he seriously doubts whether the data at hand give a true picture of the actual abundance. The seasonal nature of the catch is described, and possible causes for variability in the length and character of seasons are discussed. The author concludes his analysis of the complexity of the problem by saying: "We have, therefore, been compelled to acknowledge at once that our outlook upon the natural abundance of the fish is through a medium, which surely distorts it, and which is affected in unknown ways by varying conditions. The nature of this medium, the fishery, must enter into all calculations, and the explanations of variations in abundance must first of all be sought in the method of the fishery and its peculiarities. However potent the biologic factors, they must necessarily be obscured and without clear definitions among the welter of economic influences." This view is supported by an extensive analysis of foreign literature, which shows that fluctuations in the European sardine fisheries have not been attributable to a few simple causes. Indeed, the separation of biologic from economic factors has there proved amost impossible, especially in view of the general inadequacy of available statistics.

Following this, Mr. Thompson discusses the general features of the commercial catch in California, its variations from year to year, usual and unusual, the effect of dominating types of fluctuations, and intra-seasonal fluctuations. He emphasizes the importance of adequate statistical records showing the size of daily catches and the yield per unit of effort, and indicates that while general life history studies are of great value in guiding and directing the plan of research, they should not usurp the place of supply studies as major problems. The author next turns to a consideration of what material is actually on hand in California for catch analysis. The reason for not at present employing the "pink ticket" catch statistics in the sardine investigation, and the necessity for qualitative sampling of the catch are made clear. Attempts at age analysis of samples by means of "reading" the scales of sardines are reported to be as yet disappointing. A general review of the data collected precedes a conclusion, which points out the logical future development of the work, and gives acknowledgments.

The second paper, by O. E. Sette, now in charge of the Division of Fishery Industries of the U. S. Bureau of Fisheries, is the report of a piece of work with clear cut aims and results that may be readily summarized. It is an endeavor to determine how extensive and how frequent sampling of the commercial catch need be, in order to be adequate and representative. The picture of the catch given by daily sampling is used as a standard; with it are compared the pictures of the catch obtained from alternate-day, semi-weekly, less frequent, and irregular sampling systems. The results of Mr. Sette's work show that without doubt (1) no system of sampling the catch is sufficiently random to represent accurately the entire population of sardines, i. e., the commercial catch is itself selective; (2) regular sampling at least twice a week is required to produce data which has a fair likelihood of representing the catch itself in a reasonably accurate fashion. The fact that this study was carried through is eloquent evidence of the thoroughness of the whole sardine program. In most fishery investigations there has been a tendency to easy assumption of the representativeness of whatever samples were conveniently obtainable, without adequate analysis of the errors involved.

Mr. Elmer Higgins, now in charge of the Division of Scientific Inquiry of the U. S. Bureau of Fisheries, presents in the third paper "A Study of Fluctuations in the Sardine Fishery at San Pedro." Methods of collecting the very extensive data are here analyzed, the sardine fishing area and changes in the fishing localities, the sizes and size-fluctuations in the San Pedro catch over both short and long periods, and the meaning of these shifts in size composition, are also detailed. Dominant size-groups which progress up the size scale with annual growth are demonstrated. Mr. Higgins closes his paper with a discussion of the practical importance of understanding size fluctuations of sardines in the commercial catch. The dependence of the character of the pack on the size composition of the runs is so obvious, that with knowledge of the size-classes dominant in previous years, it may be quite possible to foretell important characteristics of the coming season's pack.

Paper No. IV, by W. F. Thompson, is entitled "Errors in Method of Sampling Used in the Study of the California Sardine." Analysis of the sources of error in particular research methods, which is all too often neglected, will certainly contribute to raising biology to a position as one of the exact sciences. This paper is more technical than the others, but will well repay careful scrutiny by any one contemplating research on similar problems. Apparently the commercial catch of sardines contains two independently

variable units, large fish, and small fish, with certain relatively constant peculiarities. Through these a dominant or lacking year-group must pass as it grows and its appearance is undoubtedly altered by their nature. In conclusion the author says: "At present any forecasting of the 'catch' of sardines is limited . . . to the sizes below 225 mm. . . . Nevertheless, so clear cut and overwhelming are the variations between the year classes which have during the past four years entered the commercial catch, that the rosiest hopes may be retained . . . that the normal course of an age-class through the various peculiarities of the catch, etc., may be defined within narrow limits, and that the course of a certain age-class through a group may finally prove to give some indication of the relationship that class will hold in other groups."

The final paper, written by W. L. Scofield, is entitled, "The Sardine at Monterey: Dominant Size-classes and Their Progression, 1919-1923." Methods of taking samples with a view to insuring their representatives are detailed. The data summarized in this report comprise measurements of 41,500 fish taken from 2000 boatloads over 28 lunar months. While the main characteristics of intra-seasonal fluctuations in the catch of sardines are briefly outlined, most of the paper describes fluctuations from year to year. Portions of the four seasons are contrasted and great care is taken to insure that these portions are strictly comparable. The various size-classes do not always appear in the same proportions at corresponding seasons. A dominant size-class does appear in the catch and its progression through three successive years is traced. In view of the complex nature of the data itself, and of the many influences which undoubtedly affect it, it is very significant indeed that dominance is not wholly obscured by other factors.

The collection of data begun in 1919 has been continued according to the same plan ever since and that since 1923 will form the material of future reports. At the present time certain observations are being made at San Diego as well as at Monterey and at San Pedro. Undoubtedly the next series of papers will furnish information of even greater immediate value than do the preliminary fundamental investigations reported in Fish Bulletin No. 11.

SERIALS NEWLY ACQUIRED BY THE CALIFORNIA STATE FISHERIES LABORATORY.

Recent accessions to the library at the California State Fisheries Laboratory include several sets of publications which should interest many besides the laboratory's own staff members. A practically complete set of "Biometrika," indispensable to statistical workers, is now on the shelves. (Vol. IV, No. 4, only, is missing.). All the "Bulletins" of the Institute Oceanographique at Monaco (486 numbers) have been purchased, and a set of the first series of the "Anales" of this institute is on the way. (All numbers of the second series which have so far appeared are already in the library.) Through the courtesy of Dr. H. C. Redeke of the Royal Institute of Fishery Research at Helder, Holland, and of the Dutch government, a large series of Dutch fishery publications were sent. These include statistics of the fisheries since 1901 and a great number of biological studies on commercially important species. The French government has also been kind enough to present us with a full set of the publications of the "Deuxiéme Expedition Antarctique Française," and many other miscellaneous documents. It is gratifying to be informed that a considerable series of Italian government reports, largely issued by the Royal Italian Oceanographic Committee, have been dispatched to the library. The last have been sought for some time and it seemed particularly difficult to secure them. Whereas a year ago practically no Italian documents were available to the library, quite a respectable Italian section has now been accumulated, mostly by exchange.

Exchanges established with Spanish, Portuguese, Latin-American, Australian, Egyptian, Esthonian and Turkish institutions have revealed an unexpectedly large quantity of marine zoological publications from these countries. The U. S. S. R. Society for Cultural Relations with Foreign Countries has procured for us a surprising array of Russian series, issued by marine stations, scientific societies, and government bureaus. In addition to the above recent purchases include a full set of the International Fisheries Exhibition Literature (1883) and of the "Archiv für Fischereigeschichte," a number of volumes of the "Zeitschrift für Fischerei und deren Hilfswissenschaften," the "Tidiskrift for Fiskeri" and "Nordisk Tidiskrift for Fiskeri" and many separate numbers and volumes to fill out partial sets already in the stacks. The library now has exchange arrangements with at least 200 institutions, and with many individual scientists besides. —R. M. T., February 28, 1927.

LIFE HISTORY NOTES.

MALE CRABS LEGAL IN CALIFORNIA. CALIFORNIA.

Beginners at the sport of crab-fishing are often at a loss to distinguish between male edible crabs (*cancer magister*), which are "fair game," and females, which are protected by law at all times.

This question, however, may be solved by a brief examination of the flap upon the under side of the victim's shell, as is shown in the accompanying illustrations.

In the male crab the abdominal flap is narrow and its segments increase in width very evenly from the tip.

FIG. 30. Female and male edible crabs taken at Bolinas Bay, February 6, 1927. Note the wider abdominal flap of the female. The male alone is legal for the sportsman. Photograph by W. I. Follett.

On the other hand, the abdominal flap of the female is very broad, and increases in width abruptly below the first segment. —W. I. Follett.

THE OPOSSUM REACHES SAN DIEGO COUNTY.

The rapid spread of the opossum (*Didelphis virginianus*) in northern California from a focal center at San Jose has been noted, as has also its rapid spread in southern California to a point as far north as Oxnard and as far south as Temecula from other focal centers. Mr. Frank F. Gander has recently written us that a specimen was taken on December 27, 1926, in La Puerta Valley, San Diego County, altitude 2,100 feet. Here desert conditions exist as the place where the animal was trapped is described as a "mesquite thicket" near a creek. Thus it will be seen that the species continues to invade new territory. Whether it will eventually acclimatize itself from mountains to seashore is still a question. Yet already the animal has been reported from elevations of 5000 feet in the Sierra and Sequoia National Park and now comes the report of it being found in desert conditions in San Diego County.

It is quite probable that the opossum is really more widely distributed in southern California than above indicated, but up to the present time the reports at hand indicate only the distribution as noted.—H. C. Bryant, Berkeley, Calif.

ANNUAL CENSUS OF WATERFOWL AT LAKE MERRITT, OAKLAND, CALIFORNIA.

The annual count of the wild fowl at Lake Merritt was taken this year on the morning of January 21, from 9.30 to 11.30 o'clock, with the following results:

Canvasback	811
Baldpate	355
Coot	350
Pintail	233
Ring-billed Gull	201
Scaup	73
Shoveller	33
Ruddy	30
Eared Grebe	20
Snow Goose	6
Cormorant	5
Mallard	4
American Golden-eye	4
Western Grebe	4
Glaucous-winged Gull	4
Buffle-head	2
California Gull	2
White Pelican	1
Total	2,138

The greatest decrease was noted among the pintails. Their absence at this time appears to be due to local disturbances.—Joseph Dixon and George M. Wright, Berkeley, California.

Museum of Vertebrate Zoology,
Berkeley, California, January 21, 1927.

Two domestic swans not included.

NOTES ON THE FOOD OF THE WESTERN ROBIN, KINGFISHER AND OTHER BIRDS.

During the summer of 1926, a special study of the food of the western robin (*Planlasticus migratorius propinquus*) was made in the region around the north end of Lake Tahoe, since this is a veritable "robins' roost" and a favorite nesting place, with the idea of determining particularly whether robins destroy young trout fry in the streams. Three pairs nested and raised their families on the hatchery grounds and the woods about were full of them. Hundreds of observations were made of the adults when they were visiting the small streams and the shores of the lake for the purpose of obtaining food for themselves and young, only enough specimens being taken to confirm the observation made with binoculars.

In brief, it is sufficient to say that I have yet to find my first fish in a robin's stomach, or to see one being caught by this bird. The food consists entirely of insects procured from the weeds and grass or small willows along the shore, and of the larvæ of water insects secured along the bank of the streams or shore of the lake. In the wet meadows immediately adjoining the hatchery grounds, a large proportion of the food of the adults and of that supplied to the young consisted of the "water-earthworms" which are very abundant in these shallow creeks. These creeks were at all times full of small fry which the robins could have easily secured, had they so desired. Therefore, seeing a robin on the bank of a creek does not mean that the robin is destroying the fry in the creek.

The western belted kingfisher (*Ceryle alcyon caurina*) is a great pest around hatchery ponds and rearing ponds. Twenty of these birds were killed about a natural pond, after it was stocked with young fry, although beforehand only one pair was stationed here. As soon as one was killed another took its place. The stomach of each specimen taken was carefully examined and in every case from one to three small fry 2½ to 3½ inches long were found. Kingfishers do not, or can not, take the very small fry. On the lake shore, their food consists almost entirely of minnows, as the trout are too swift for them. Through the binoculars, I watched many of them fishing and without securing specimens was able to determine that about nine attempts to secure trout in open water are failures to one success.

A Cooper hawk (*Accipiter cooperi*) was shot at about 7500 feet elevation. Its stomach contained one large striped chipmunk just killed, the remains of a small chipmunk and of a baby grey squirrel.

Observations with the binoculars were made on many water birds with the following conclusions as to food:

American eared grebe (*Colymbus nigricollis californicus*). This grebe was quite common about the north end of Lake Tahoe, breeding about points where sufficient tules could be found for a nesting site. It was a common sight to see the young riding on the mother's back. Counts of as many as twenty-one on a single mother's back were made. Observations show that the food of the adults consists mostly of minnows. The young begin to catch them as soon as they are able to swim about well which is about ten minutes after they break the shell. When most active, the mother catches a minnow every five minutes. Their food is not all fish, however, as they secure a large number of insect larvæ, snails, and also vegetation in the shallow waters along shore.

This bird was also present on Mono Lake in considerable numbers with the pied-billed grebe and living on the Mono Lake shrimp.

The merganser ducks probably are the worst offenders in the destruction of young trout. I have seen one swim under water several feet and capture a trout twelve inches in length. It also wounds many trout which it is unable to hold, and which probably die later from the injuries.

Pied-billed grebe (*Podilymbus podiceps*). During October this bird was present in countless thousands on the lake, feasting on the Mono Lake shrimp. They were distributed evenly over the entire surface of the lake and very tame, hardly getting out of the way of the boat.

Western grebe (*Aechmophorus occidentalis*). A few pairs of this species were seen in Hot Spring Cove, at the east end of Paola Island in the lake, where the Mono shrimp was very abundant. Mrs. McPherson, wife of the owner of the island, says they breed here.

Mallard duck (*Anas platyrhynchus*). These ducks were present in a flock of a thousand or more at the mouth of Rush Creek, but no opportunity occurred to study their feeding habits.

Black-necked stilt (*Himantopus mexicanus*). Pairs of these birds were present in considerable numbers about the lagoons, and watching them stalk the immense swarms of Mono Lake flies, into which they would dive head first for

mouthfuls, afforded us considerable sport.

Least sandpiper (*Pisobia minutilla*). This bird was abundant in flocks of a hundred or so on the lake shore and lagoons, feasting on the flies and their larvæ.

Since many waterbirds resort to Mono Lake, there is abundant proof that waterbirds can exist and prosper without any fish food in their menu, for there are no fish in this lake.—George A. Coleman.

FOOD HABITS OF TROUT.

When a trout strikes at your royal coachman, what does he think he is getting? We wondered. Out of sheer curiosity and a desire, perhaps, to improve our ability as anglers, we began to investigate the matter. Soon, with the interested assistance of park anglers, entomologists and chefs, we were deep in trout dietetics.

The very first day of our investigation proved eventful. While taking our morning swim in the Merced we saw a lone fisherman on the opposite shore. What luck! Here we could get material with which to start at once. We waved excitedly and asked the man if he had any fish. Yes: but why two young ladies were so excited about his four trout we could not make him understand across the river. Much to his amazement we dived in and swam over. Thus we met Tony, Camp Curry cook and one of the most enthusiastic fishermen in the valley. Surely we could have the stomachs from his fish—all that he caught for the rest of the season and all those which came into the kitchen of Camp Curry.

That afternoon those four Rainbow trout stomachs from the Merced were opened at the Yosemite Museum. Professor Essig of the University of California was present. From what appeared to us unrecognizable insect fragments Mr. Essig began pulling out almost perfect specimens—ladybird beetles, caddis cases, hoplias, a wasp. Suddenly he became excited, examined an insect shell closely, turned to a book, read for a few moments, examined the specimen again under a lens, and finally announced that here we had the larva of a rare insect—none other than the "aquatic dascillid." Surely a trout's stomach was the last place one would expect to find this. Thus our first day ended with enthusiasm running high.

From June 21 to August 5, 1926, 100 stomachs were examined. The appended table gives our data concerning them:

HUNDRED TROUT STOMACHS EXAMINED.

No.	Species	Locality	Stomach contents	Date (1926)
4	Rainbow	Merced River	Lady bird beetles; caddis cases; pubescent hoplii; wasp; acquatic dascilli; salmon eggs (bait)	June 24
1	Rainbow	Merced River	Salmon eggs (bait); Caddis fly larvae	June 28
6	Rainbow	Merced River	Caddis fly larvae in cases; crane fly larvae; grasshoppers; pubescent hoplias; stink bug; angleworm	July 6
3	Rainbow	Merced River	Lady bird beetles; oak tree hopper; click beetle; metallic wood borer; water strider; robber fly	July 15
3	Rainbow	Lost Valley (Merced Pool)	Black ants; crane fly larvae; predaceous ground beetle; lady bird beetles; pubescent hoplia	June 27
18	Rainbow	Crane Creek (El Portal)	Grasshoppers; Predaceous ground beetle; stone fly nymphs; stone flies (adult); whirligig; caddis fly larvae in cases; dragon fly nymph; wasps; click beetle; ten-Lined June beetle; darkling ground beetle; earthworm; water skater	July 1
4	Eastern Brook	Bridal Veil Creek	Black ants: Caddis fly larvae	July 4
13	Eastern Brook	Yosemite Creek	Darkling ground beetle; Lampyridae; click beetle; black ants; caddis fly larvae in cases; whirligig	July 5
10	Eastern Brook	Merced River	Lady bird beetles; mosquitoes	July 25
2	Rainbow	Babcock Lake	Empty	July 26
8	Rainbow	McClure Fork	Parnidae; plant fragments	Aug. 3
2	Eastern Brook	Young's Lakes	One empty; lady bird beetle; caddis fly larvae	Aug. 5
8, 10	Loch Leven, Eastern Brook	Glen Aulin	Long horn borer; predaceous ground beetle; other insect fragments not identified; several stomachs empty	Aug. 7

Investigations indicate that in the valley—Merced River—and at El Portal—Crane Creek—where there is an abundance of vegetation and insect life, the trout have an abundance of food. We have not decided what significance this condition has for the angler. Do the trout strike at artificial flies more readily because they are accustomed to catching insects on the water or does the abundance of natural food make fishing more difficult? The stomachs of trout caught in the upper mountain streams have less in them. Black carpenter ants seem to be the chief article of diet. In the high mountain lakes insect food seems to be very scarce and most stomachs are entirely empty. The few which contained food had very little in them. Mr. Russell, park naturalist, reports catching fish in a High Sierra cirque and upon examining the stomachs found that they contained many small bivalve mollusks.

Since the remains of many small insects which may be seen floating on the surface of streams are found in the stomachs of trout, surface feeding of the fish is indicated. Inasmuch as some of the insects are more nocturnal in habits, as the predaceous ground beetle, a part of this feeding may occur at night. Bits of cedar and pine needles in the stomachs indicate that the fish sometimes make a mistake in their judgments. The presence of caddis fly larvæ in cases, stone fly nymphs and crane fly larvae suggest that the fish obtain part of their food under water—sucking off whatever adheres to floating stems, plants, etc. It is interesting to note that lady bird beetles, which are apparently so ill tasting to birds and are avoided by them, form one of the chief sources of food for trout. Dragon fly nymphs sometimes attack young brook trout, as young as themselves; we are glad to find, therefore, that the trout occasionally reversed the situation and had a meal themselves.

Do we know any more about fishing because of this investigation? Practically all the fish examined were caught with Royal Coachman, a grey or brown hackle. As these bore little resemblance to the stomach contents, we have come to the conclusion that it is not the kind of bait you use here in Yosemite which counts, but the realistic way in which you make it alight on the water.—Helen Y. Howe and Avis Meigs, Yosemite Nature Notes, Vol. 5, No. 12, pp. 93-94.

GAME PROPAGATION IN OTHER STATES.

NEW YORK.

The Commission's game farm continued to operate during the year with that high degree of efficiency that has characterized their performances in the past, raising more crops and distributing more pheasants and pheasant eggs than were raised and produced during the previous year.

An erroneous belief, and one shared by many people, is that the game farms produce pheasants and pheasant eggs only; that is, the state game farms are wholly devoted to the production of pheasant eggs and pheasants. Thousands of chickens are each year raised on the game farms. These birds play no small part in the rearing of the pheasants. Pheasant eggs to be incubated at the farms are hatched under hens and cared for by them until arrival of distribution time. Mallard ducks are in a small way also raised on the Sherburne Game Farms. Beginning with a setting of eggs a few years ago, the farm has continued the work, each year liberating all ducks produced. These mallards have propagated and multiplied until there is now a permanent occupancy by them for miles surrounding the farms, the ducks nesting in this area and not migrating.

The paramount function of the farms is the production of pheasants and their eggs, but greater acreage is utilized in raising corn, wheat, buckwheat, oats, barley and beets than is used in the actual work of propagating the birds.

Pheasants can not be successfully raised on a farm where every acre is in the same year used by the birds. Where this has been tried failure always resulted. Much of the disease that attacks the birds is the direct result of allowing the ground to become contaminated through too long use. The best method of raising pheasants, and the one conducive of the best results, is that in use on the state game farms. The acreage used for rearing purposes this year will not be again used for three years. Meanwhile, it will be each year plowed and planted to corn, wheat, oats and such other crops as are usually raised on the average farm. In the year the acreage is to be again used as a breeding ground it is plowed and sown to grass.

The crops raised on the farms supply food for the pheasants and chickens, and forage for all domestic animals maintained on the farm, as well as providing a means of raising the young pheasants

under conditions identical with those they will find when liberated. The pheasants on the farm, except those kept for breeding purposes, are not kept cooped up, but are at an early age liberated in company of a hen to act as guardian until the chicks are able to shift for themselves. When this time arrives they are trapped up and sent to the parts of the state into which some person had, by filing an application, expressed a desire to have additional birds introduced.

The liberation of pheasants is not as a general thing done by the commission. The person applying for pheasants is the person to whom birds are shipped. The Commission will not honor any application that does not indicate the applicant is willing to pay the cost of a telegram advising of shipment, the express charges, and a willingness to do the actual work of liberating the birds upon arrival.

This is also true of applications for pheasant eggs. Applicant, unless application be made in the name of a game club, must assure the commission that ample facilities are had for the hatching out of the eggs under hens, and the young pheasants will be turned loose in covers adapted to their habits when of a size that will permit of liberation with reasonable safety. Game clubs desiring eggs sent in their care are obliged by the commission from time to time to visit the persons into whose care the eggs are intrusted for hatching, to see that they are being properly incubated and that the young chicks are being allowed free range with their foster parents. When the young birds have progressed to the stage where it is advisable to turn them loose, the clubs must see that the birds are liberated.

Many clubs assuming this responsibility have found that much better results can be gained by sending one or more representatives to the game farms to be instructed in the handling of eggs, setting of hens, and feeding of the young birds. This knowledge is in turn passed on to the members of the clubs so that when they commence the work of looking after the hatching of the eggs they know just how to go about the problem to accomplish the greatest good.

The 1926 season on the farms was a very successful one, and this in spite of the fact that much weather unfavorable to pheasant raising was experienced in the spring and early summer. Many privately owned farms reported a total loss of all birds this year. The state farms, however, suffered no trouble that was not overcome. There were 3200 breeders on the farms and in the second week of April the first eggs arrived. By May 10 the birds were laying an average of 2200 eggs a day. This egg laying continued unabated through the summer until 141,079 eggs had been laid. The ratio of cocks to hens retained for breeding on the farms is one to five, so the average number of eggs laid by each bird was slightly more than fifty-five.

The first eggs to be produced on the arms were retained for hatching purposes. It was from the birds hatched from these eggs that additions were made to the breeding stock of the farms. From these birds 2041 of the most virile and healthy specimens were kept over for service next year. The remainder, 11,918 birds, were sent out to persons who had applied for them and who liberated them in covers that had been previously selected.

The cost of producing a pheasant and bringing it along to liberating age varies slightly each year. The average price per bird, following the prescribed method of figuring costs that has been adopted by other states, is found by deducting from the net operating expense of the game farms the value of the adult pheasants retained as breeders and the value of the pheasant eggs distributed. The remainder is chargeable to young pheasants distributed. The cost per bird is then found by dividing the number of birds distributed into these figures. Computed over a period of five or more years, the average price per bird produced on the state game farms and brought to liberating age is found to be about twenty-five cents.—Sixteenth Annual Report, Conservation Commission of New York, pp. 86-90.

NEW JERSEY.

The total game distribution for the year was as follows: 18,428 pheasants, 12,937 being liberated from our farms; 3886 liberated as result of public distribution of eggs and 1605 purchased from dealers; 36 quail, 1029 Hungarian partridges and 10,483 rabbits.

With the first fall of snow a circular letter is sent to each warden requesting him to make every effort to locate and feed the game and to erect shelters and arrange with sportsmen, rural mail carriers and others to cooperate in the work. Every year more attention is being given to this matter by sportsmen and farmers, who have seen that at small expense a great amount of game can be preserved.

The wardens reported coveys found and fed as follows: Quail, 630 coveys, 6355 birds; English pheasants, 401 coveys, 5098 birds; Hungarian partridges, 71 coveys, 619 birds.—Annual Report of the New Jersey Board of Fish and Game Commissioners, 1925-1926, pp. 26-27.

PENNSYLVANIA.

More than $275,843.44 has been expended during the biennium for the purchase and feeding of game. . . .

The amount spent for game purchased has been considerably larger than during any similar period in the history of the board. Purchase of deer for stocking purposes has been discontinued, and all of the funds that can be devoted to game purchases are being used to replenish our supply of small game. The big difficulty, however, is to secure native game birds, such as wild turkeys and ruffed grouse in quantities.

For the first time in the history of the board, steps have been taken to stock Hungarian partridges, which birds have done splendidly in a number of western states and Canadian provinces. From studies made by the president of the board and our executive secretary, we are convinced that these birds will thrive in Pennsylvania and will withstand our severe winters much better than will our native bobwhite quail. We find Hungarian partridges do not lend themselves to wide distribution in small numbers, and stocking must be confined to segregated areas. We have closed the entire state to the hunting of these birds for 1926, and if desirable will take action to give them further protection next year.—Biennial Report of the Board of Game Commissioners, of the Commonwealth of Pennsylvania, 1925-1926, pp. 9-10.

VERMONT.

Approximately 3600 pheasant eggs were set and 2090 birds hatched during the season of 1925. While the first 1000 eggs gave us a hatch of 70 per cent the rest of the hatches were very low, giving a hatching total of 58 per cent. Many of the birds hatched were weak. The low fertility and weak birds were evidently caused by the poor season. The number of birds shipped out totaled 1573. Owing to the fact that we had no fences around the rearing field many birds drifted away which we were unable to catch. The unusual amount of wild grapes, berries, etc., in the neighboring woods and fields offered them more than ordinary enticement. Vermin was very plentiful, causing us a heavy loss. Out of one hatch of 500 birds a loss of over 200 came when they were about three weeks old, due to their eating the yellow petals which dropped from the mullen plants. We moved them as soon as we found out what caused the trouble and saved the rest of the birds. A loss of over 100 came from a heavy storm in spite of the fact that the men worked all night in the rain trying to save them.—Twenty-eighth Biennial Report, Department of Game and Fish, State of Vermont, p. 18.

RHODE ISLAND.

This commission receives occasional complaints for its failure in the past to operate a game farm, or to purchase in large quantities pheasants and other game birds and animals, but we feel, and we have felt for several years, that the most important work which we can do in conserving our bird and animal life is to preserve those animals native to our woods and fields. Most careful investigations have been made by the game departments of the various states to ascertain the success which has attended the importation of all sorts of game birds and animals into various states in this country. At one time quail were imported successfully, and in the far west the European partridge, commonly known as Hungarian partridge, has been imported and has thrived well and has increased tremendously in numbers. An effort to release such birds in this state was made several years ago. So far as is known, not one Hungarian partridge survived the second season, and that is the unanimous report of the game departments of every state east of the Mississippi River. If such is the universal finding, it would appear foolish to spend very much money for the importing of that bird. Quail can not now be bought from any state in this country and no private breeders are allowed to ship them, or could furnish them, if allowed. Mexican quail are procurable, but they come from a far warmer climate and this commission feels that they are not only unsuited to the rigors of our Rhode Island winters, but by interbreeding with our local stock, lower the vitality of native Rhode Island quail. Furthermore, while quail are, and probably always will be—at least for many years in the future—plentiful in the sections of our state close to the salt water, where the salt air prevents long accumulations of deep snow, we have in Rhode Island every four or five years a long, hard winter with deep snow, which means the certain destruction of every quail or other ground feeding bird in the sections of the state removed from the influence of salt water, except such as are fed by artificial means while the deep snows last. After such a season, in the course of time, quail begin to seed back into these sections and there are now very considerable numbers of quail in more remote sections of the state. It is only a question of time

when long continued heavy falls of snow will again reduce their numbers to the vanishing point and it will be necessary for us to start all over once more. Under these circumstances, the commission feels that, even if it could procure quail for planting, no permanent result would be gained thereby.—Biennial Report of the Commissioners of Birds, State of Rhode Island and Providence Plantations, 1926, p. 67.

MARYLAND.

Desiring to start the propagation of bob-white quail we decreased our broodstock of pheasants. Prior to August 15th, we raised approximately 3000 birds, but due to the extreme wet weather which brought on diarrhea, we were only successful in liberating 1180. We began the season with nine pairs of bob-white quail. On July 1st lost one hen bird which left eight pairs for propagation purposes. From these birds we collected 363 eggs; hatched 342 birds and on August 15th, we had in our pens about 300 at which time the rainy season came on, lasting more than ten days during which period we lost from diarrhea about 175 birds. At present we have around 100 bob-white quail raised at the game farm this season which we are holding as broodstock for the season of 1927. We have placed contracts for bob-white equipment and hope to increase our activities along this line tenfold during the coming season.—Fourth Annual Report of the Conservation Department of Maryland, pp. 74-75.

WEST VIRGINIA.

The State Game Farm, containing 327 acres, was first occupied late in the year 1924. The first propagation of game birds on this farm, however, was not begun until the spring of 1925. Birds previously distributed were reared on a nearby privately owned farm.

The first year's propagation of pheasants and other game birds on the new farm was considerably hampered by reason of crowded and imperfect quarters and construction disturbances caused in building. In spite of this, however, the superintendent of the farm had remarkable success in keeping down the diseases common to these delicate young birds and was able to bring through a high percentage of the pheasants, and to distribute 437 ring-necked pheasants to persons throughout the state. The greatest loss was suffered from the killing of the birds, both young and old, by vermin.

The year's experience shows the futility of undertaking game bird propagation without proper safeguarding against predatory animals and birds. The toll taken on the game farm includes 216 ring necked pheasants, about 20 pair of Hungarian partridges, and several silver pheasants.—Fifth Annual Report of the Game and Fish Commission of West Virginia, p. 13.

SOUTH CAROLINA.

The last session of the legislature allowed $5,000 to erect and maintain a game farm. This was a small amount to accomplish anything with. Nevertheless the results have been most satisfactory. I now have on hand a nice herd of deer, a good flock of wild turkeys, and several hundred English ring-necked pheasants. All of these were obtained after it was too late to do much along the line of breeding and raising, but next year I shall be able to put these species of game throughout the state, and if they are properly appreciated and protected, in a very few years all of the counties will be supplied with game. The method of distributing game is to allow any reputable landowner of this state to get game from the farm for the purpose of raising same. He will have to protect same for two or three years, during which time the game would have the chance to breed and increase on this particular piece of property, and eventually migrate all over the county. This is a system that has been used by other states and has been successful along these lines. I am positive that we are reaching a stage where we must replant what we destroy. By starting now, we can keep our state stocked with game without cost to anyone, except the hunters who buy licenses and the violators who pay fines.—Report of A. A. Richardson, Chief Game Warden of the State of South Carolina, 1923-1924, p. 5.

MICHIGAN.

In 1916 this department purchased a two hundred acre farm, seventeen miles southeast of the city of Lansing, now known as the Mason State Game Farm, and in the spring of 1917 we got started in a small way through the purchase of about two hundred stock ring-necks, most of them coming from the Oregon State Farm and the balance from California. These birds cost the department $3.25 each; and a few eggs bought from private, licensed breeders cost us $25 per hundred.

The work during 1917 and 1918 was somewhat of an experimental nature and

few birds were produced or liberated, although at the end of the period we had acquired a substantial breeding stock of birds and the necessary equipment. In the spring of 1919 we were fortunate in securing the services of an experienced game breeder from New Jersey, and since that time production of birds on the farm, alternated with grain crops as a safeguard against disease, has progressed satisfactorily and without interruption.

We think the sportsmen of Michigan will verify the statement that our efforts have proven fairly successful and that the ring-necked pheasant is thoroughly established, at least in southern Michigan; that they are a fine game bird and that they are putting a thrill into Michigan sports afield. Further than this, the open season on pheasants must attract thousands of hunters who otherwise would be turning their guns on the ruffed grouse that is sorely in need of all possible protection.

In 1926 there were 43,777 pheasant eggs laid on the farm. Of this lay 9000 were set and 7441 brought to maturity. State distribution numbered 30,040 eggs, the remaining eggs were used to feed young pheasants. Of mature pheasants reared, 5841 were distributed in state covert. Breeding stock was reserved to the number of 1600. Distributed in the lay for 1926 were 1000 eggs brought from Ohio for blood diffusion. Other birds reared on the farm were: woodduck, 8; blackduck, 7; Canada geese, 14; mallard, 160.

Quail were reared to the number of 35. Five white-tailed deer fawns were received from northern wilds. Old breeding pheasants from previous year were released in wilds to the number of 735.—Biennial Report, Department of Conservation, State of Michigan, 1925-1926. pp. 28-30.

NORTH DAKOTA.

The Game and Fish Department first started to introduce the ring-necked pheasant as a game bird in 1915, and continued their efforts in subsequent years with indifferent success. A good many young birds were released in the fall of the year with no chance to become accustomed to looking out for themselves. Raised under hot-house conditions, as we might say, when turned out to rustle for themselves they quite naturally were bewildered by new conditions and were an easy prey to predatory animals and birds.

Many eggs were furnished farmers and others who wished to try and raise them to be released on their farms. This is theoretically an ideal way to stock a covey, but it is seldom a success, for various reasons.

During the past three seasons we have turned out something over 1000 birds at a cost of approximately $5 each. Where we found someone who would care for them during the winter, they were put out in the fall; otherwise in the spring, the preferable way, as then everything in nature tends to put the situation as regards food and weather in the best possible condition for good results.

Reports circulating from time to time over the state to the effect that the introduction of the pheasant will drive out or replace our native grouse do not appear to be based on facts, but rather on theory.

The pheasants furnish a lot of thrills to the sportsmen and have a place in our game life.—Eighth Biennial Report of the State Game and Fish Commission of the State of North Dakota, 1923-1924, pp. 14-15.

SOUTH DAKOTA.

In November, 1924, the Game and Fish Commission declared an open season on cock pheasants in 23 counties, ranging in duration from two to fifteen days, depending on the number of birds in the various counties opened. The wardens in charge of this hunt, as well as many of the hunters, declared this to be some of the greatest sport they had ever enjoyed in the state, it being estimated by supervisor of wardens, L. C. Hawley, that the number of pheasants killed during the season was about 250,000.—Sixteenth Annual Report, Dept. of Game and Fish of South Dakota, 1925.

MISSOURI.

Signal success was achieved in deer propagation, as approximately twenty fawns were added to the herd. A much better record is expected in future years as many of the deer purchased last year were little more than a year old. A feature in game propagation is the work being done by the department in replenishing the greatly depleted stock of wild turkeys In this connection we want to call attention to three hundred head of the original blue head wild turkeys, which were purchased in the south and are now being propagated in specially prepared turkey refuges. This was done rather late in the year, but it is believed much success will be attained as the refuges contain an abundance of cover and they present ideal conditions for breeding. Turkeys have been placed in three refuges, each twenty acres in area. There is an abundant water supply. Native Missouri quail are

being propagated in the refuges and their numbers were increased. The ring-neck pheasant was also introduced in a small way at the refuge located at Big Spring State Park, Carter County.—Annual Report of the State Game and Fish Commissioner of Missouri, 1926, p. 52.

ARKANSAS.

It seems very unwise to inaugurate a broad program of game propagation in view of our present ineffective protective system. The department has never felt that it would be justified in spending any great amount of the money paid in by men who hunt and fish, for rearing and distributing game that could hardly be expected to dodge our many hunters and dogs through one of our present lengthy seasons. Should we have the necessary protection, however, it would be necessary that the department's income be increased before the extensive program demanded by our thousands of hunters could be launched.

Propagation work at the Rogers State Game Farm has gone along most satisfactorily. Ring-neck pheasants are the principal product, while a few bob-white quail are reared each year and a very good bunch of wild turkeys is being built up. Bob-whites have been planted in only one or two sections, generally on refuges created by groups of farmers, a majority of the ones reared having been exchanged with game wardens of other states for desired species or the eggs of same. Wild turkeys are reared so that propagation in considerable numbers can begin immediately on the passage of necessary protective laws.—Sixth Biennial Report, Arkansas Game and Fish Commission, 1926, pp. 9-10.

IDAHO.

A portion of the ring-necked pheasants shipped to Idaho in 1909 were liberated during the fall of that year in counties of low altitude, the balance being distributed through the state as far north as Bonner County during the year 1910. Unfortunately, the birds sent to the extreme northern counties, or where climatic conditions were unusually severe, did not survive. As a matter of fact, several years elapsed and there was practically little or no indication, even in favorable sections, that these birds were increasing, when suddenly, and after about five or six years, they seemed to appear everywhere and from nowhere in particular. From that time on and by reason of a closed season, they multiplied rapidly, so much so, in fact, that the legislature provided at first a short open season, with a bag limit of two, which has now been extended to thirty days, with a four-bird bag limit per day or in possession.—Tenth Biennial Rpt. of the Fish and Game Warden, Idaho, 1923-1924, p. 50.

Game birds now open to shooting at regulated seasons are the Chinese pheasant, Hungarian partridge, California quail, native quail or bob-white, sage hens and the blue, ruffed, pintail and Franklin grouse. The first three species have been introduced by the department and are not native of the state, the other game birds are natives and have not been propagated at the state game farms. The two state game farms have reared and liberated to date, 1249 Chinese pheasants, 61 Hungarian partridges. The farms have reared and retained for breeding purposes about 500 birds.—Eleventh Biennial Report, Fish and Game Warden, Idaho, 1925-1926, p. 29.

WYOMING.

The plan to stock the state with Chinese ring-neck pheasants and Hungarian partridges is in its infancy. We have about 200 stock pheasants that we are holding for next season. If the game bill is enacted and we are permitted to carry on our program we expect to propagate several hundred of these birds during the summer of 1927.

Last season we released 27 pair of Hungarian partridges, and it is our plan and intention to purchase and release a number of these wonderful game birds each year. They are prolific breeders and once they become adapted to climatic conditions they propagate very rapidly.—Biennial Report, State Game and Fish Commissioner of Wyoming, 1925-1926, p. 23.

OREGON.

Three game farms are now maintained by the commission, the eastern Oregon farm at Pendleton having been completed and put in operation during the present biennium. The establishment of this unit has made it possible to liberate a greater number of Chinese pheasants than heretofore possible.

Wild turkeys have been liberated in Oregon for the first time. Exceptionally good results were obtained at the Pendleton farm in rearing these birds and a number have been liberated in Curry, Jackson and Josephine counties. It was thought these counties furnished an environment more nearly like the country in which wild turkeys were originally found and for a time at least the effort to make this a game bird in Oregon will be cen-

tered in these three counties. If the turkeys can be established there, experiments will be made in other parts of the state.

The problem of raising Hungarian partridges in captivity has also apparently been solved by our game farm department under the supervision of 'Gene M. Simpson. It has always been considered impossible to handle these birds at a game farm. More than 800 of them were hatched at the Oregon game farms in 1926, most of them at Pendleton, and although the subsequent percentage of loss was higher than among pheasants approximately 400 birds are now being held for breeding stock and will serve as a nucleus for what is expected to be the beginning of an important phase of the game propagation. This year's heavy loss of young birds was due to overfeeding of rich foods. Lack of experience with the birds was responsible.

The Corvallis farm, the oldest in the state, the equipment of which has deteriorated to such an extent as to make it unsuitable for pheasant propagation without rebuilding, is being remodeled to accommodate Hungarian partridges.

Under the supervision of 'Gene M. Simpson the game farms have reached the enviable position of being pointed to as models by other state departments of game propagation. Neighboring states have asked his assistance in laying out their farms and have sought his advice in solving the problems with which they are confronted.—Biennial Report of the Game Commission of the State of Oregon, 1925–1926. pp. 11–12.

WASHINGTON.

The Hungarian partridge was first introduced in eastern Washington about 1897 and has seemed to prosper. The next liberation of which we have a record was in 1906, and then through many of the years which followed up to 1918, other liberations of this bird were made in various localities in what may be regarded as generous numbers, care always being exercised that the localities where this was done were favorable to the species. And invariably the birds were given full protection, there being no open season for a period of years. Finally, when this was allowed, it was at first a short one and the bag limit small. The result of this has been that the Hungarian has proved a success in eastern Washington nearly from the time of its introduction up to the present, for now there is hardly a county on the east side that does not afford the opportunity for good sport with it.

These birds seem to be admirably adapted to eastern Washington, especially in districts where cereals are raised. I am told by a citizen here, who used to hunt these birds for the market in Austria-Hungary, that they are as individuals much better birds as to plumpness and size than the birds of Europe. This leads one to believe that our section of the country is so favorable to their growth and development that an improvement has been made by reason of this fact over their native country.

They are very hardy and prolific and are as contented in a patch of weeds, taking the seed for food, as they are in a wheat field. From personal knowledge I know that in some cases the female birds produce two coveys in one season. They lay anywhere from sixteen to twenty-four eggs. Usually a covey when hatched runs from fourteen to eighteen birds, and a few coveys are found where the old one has raised twenty.

From the standpoint of a game bird, I believe them to be the gamiest of them all. The law of the covey is very strong and when they flush all of them go at the same time. There seems to be less than a fraction of a second between the time the first one and the last one makes his get-away. They will always be able to take care of themselves since they become very wild when much shooting is done. When one is winged or slightly wounded so that he can not fly he will run a mile sometimes before a hunter's dog overtakes him.

During the winter months they come right into the towns and eat at the back doors of the residences. They will help themselves to straw stacks, hay stacks, and anything edible. At night they burrow in the snow, sometimes making little tunnels four or five feet long under two feet of snow. I have hunted upland game birds in the west covering a period of thirty-seven years, but I believe the Hungarian partridge, considered from every standpoint as a game bird, is the premier one of the Pacific coast.

In western Washington, judging from the past, it would appear doubtful that this bird will ever prove the success it has in the eastern part of the state, but even at that, it could by comparison fall quite far short in numbers and still its introduction would be regarded as not lacking in success.

This partridge has, therefore, proved a welcome addition to the game birds of our state, and in one way has helped to save our native ones. For since an open season in connection with it has been allowed, these latter have not been so persistently hunted as they formerly were, and as a consequence this has obviously proved to their advantage.—S. F. Rath-

bun, *American Game*, Vol. 15, No. 4, pp. 77–78.

NEVADA.

Forty-seven pheasant hens and fifteen cockerels were purchased for stocking the rearing-pens at the Nevada School of Industry.

The attempt to hatch birds at this school has proven a failure, and the commission recommend that future efforts in this line be conducted at the grounds of the Verdi Hatchery where the hatching and rearing of the birds could be under the direction of a trained man. There is sufficient ground available at the Verdi Hatchery for such purpose.

Twenty-five pair of Hungarian partridges were purchased and liberated on the Recreation Grounds and Game Refuges in Elko and Churchill counties.—State of Nevada, Biennial Report of the Fish and Game Commission, 1923–1924, p. 15.

REPORTS.

VIOLATIONS OF FISH AND GAME LAWS.

October, November and December, 1926.

	Number arrests	Fines imposed	Jail sentences (days)
Violations of Angling License Act	8	$150 00	
Violations of Commercial Fishing License Act	18	210 00	
Trout: over limit	9	225 00	
Salmon: illegal sale	1		
Salmon: taking with spear	5	425 00	
Salmon: closed district	1	100 00	
Striped bass: undersized, over limit	9	255 00	
Striped bass: closed season	4	75 00	
Crabs: transportation from district 1½	1	180 00	
Crabs: closed season	2	45 00	
Clams: undersized, over limit	34	705 00	425
Abalones: undersized	15	400 00	
Lobsters: undersized	15	465 00	
Illegal fishing: within 250 feet of fishway, 150 feet of lower side of dam	11	100 00	
Illegal night fishing	5	125 00	
Killing fish with explosives	3	200 00	
Water pollution	2	300 00	
Nets, traps, lines: illegal possession or use	8	300 00	125
Totals	151	$4,260 00	550

SEIZURES OF FISH AND GAME.

October, November and December, 1926.

Ducks	649
Geese	43
Shore-birds	9
Doves	6
Pheasants	4
Quail	224
Non-game birds	122
Deer meat, pounds	1,516
Doe hides	1
Fawn hides	1
Buck heads	1
Spike bucks	1
Rabbits	25
Squirrels	2
Trout	471
Striped bass, pounds	516
Salmon, pounds	1,400
Clams	954
Crabs	1,358
Crab meat (out of shell), pounds	180
Shrimp meat, pounds	15
Abalones	103
Lobsters, pounds	680
Crawfish	86
Nets	2

GAME CASES.

October, November and December, 1926.

	Number arrests	Fines imposed	Jail sentences (days)
Violations of Hunting License Act	74	$1,140 00	100
Deer: closed season	23	885 00	
Deer: does, fawns or spiked bucks	15	850 00	
Deer: failure to retain horns and hide	4	450 00	
Deer: evidence of sex removed from hide	1	50 00	
Ducks: illegal killing or possession	5	175 00	210
Ducks: possession or killing of wood ducks	11	100 00	
Geese: sale of	3	50 00	
Geese: over bag limit	3	50 00	
Swans: possession or killing	5	150 00	60
Cranes: possession	1	50 00	
Doves: closed season	11	233 00	
Wild pigeons: killing or possession	5	210 00	
Shorebirds: killing or possession	7	175 00	
Quail: closed season	57	2,063 00	90
Pheasants: closed season	5	425 00	
Sage hens: over bag limit	1	50 00	
Rabbits: cottontail, brush, Sierra hare, closed season	18	450 00	
Squirrels: tree; closed season	6	160 00	
Non-game birds: killing, possession	49	1,605 00	10
Bird nets, traps: illegal possession or use	6	175 00	
Game refuges: hunting, possession of firearms	2	50 00	
Trespass	6	135 00	
Shooting game from automobile, power boat	11	280 00	
Night hunting	23	400 00	200
Fur trapping regulations	3	20 00	
Totals	355	$10,481 00	570

STATEMENT OF INCOME.

For the Period October 1, 1926, to December 31, 1926, of the Seventy-eighth Fiscal Year.

	Detail	Total
License sales:		
Angling	$68,220 50	
Hunting	108,968 30	
Market fishermen's	6,750 00	
Trapping	2,406 00	
Wholesale fish packers' and shell fish dealers'	315 00	
Game breeders'	17 50	
Fish breeders'	20 00	
Kelp	10 00	
Total license sales		$186,707 30
Other income:		
Court fines	$19,608 56	
Fish packers' tax	15,930 95	
Fish tag sales	1,673 21	
Game tag sales	37 80	
Miscellaneous sales	269 75	
Interest on bank deposits	615 09	
Total other income		$38,135 36
Total income		$224,842 66

STATEMENT OF EXPENDITURES.

For the Period October 1, 1926, to December 31, 1926, of the Seventy-eighth Fiscal Year.

Function	Materials and Supplies	Salaries and Wages	Service and Expense	Property and Equipment	Total
Administration:					
Executive and legal		$3,830 00	$509 60	$118 50	$4,458 10
Clerical and office	$271 58	4,468 22	518 34	142 39	5,480 53
Rent			2,454 73		2,454 73
Telephone and telegraph			824 73		824 73
Postage			529 36		529 36
Freight, cartage and express			202 98		202 98
Printing	3,216 55				3,216 55
Automobiles	73 24		140 15		213 39
Accident and death claims			1,370 74		1,370 74
Total administration	$3,561 37	$8,298 22	$6,630 63	$260 89	$18,751 11
Education and research:					
Director and assistants	$7 91	$1,725 00	$318 21	$9 00	$2,060 12
Publicity:					
Director of publicity		$825 00	$235 76		$1,060 76
State Fair exhibit	$5 00	28 00	34 36		67 36
Total publicity	$5 00	$853 00	$270 12		$1,128 12
Conservation and protection (patrol and law enforcement):					
Chief and assistants		$2,169 98	$271 51		$2,441 49
Clerical and office	$43 43	1,073 07		$93 31	1,209 81
Rent			80 64		80 64
Captains and deputies	297 71	38,346 42	28,827 84	10 88	67,182 85
Patrol launches	357 41	527 23	162 30	107 26	1,154 20
Automobiles	211 00		22 65		233 65
Statistics and game problems (protection)	2 35	490 00	59 34	5 35	557 04
Lion hunting		405 00	223 81		628 81
Lion bounties			1,360 00		1,360 00
Total conservation and protection	$911 90	$43,011 70	$31,008 09	$216 80	$75,148 49
Commercial fisheries:					
Chief and assistants	$107 16	$3,879 48	$439 55		$4,426 19
Deputies	1 10	4,796 64	1,787 35		6,585 09
Laboratory research	91 31	5,692 74	726 02	$436 29	6,946 36
Statistical	2 40	960 00	47 87		1,010 27
Patrol launches	591 54	255 00	65 72	17 65	929 91
Salmon tagging	288 00	143 33	297 42		728 75
Botulism			3,750 00		3,750 00
Total commercial fisheries	$1,081 51	$15,727 19	$7,113 93	$453 94	$24,376 57
Fish culture:					
Chief	$5 15	$949 98	$63 65		$1,018 78
Clerical and office	15 06	960 00	7 45	$3 09	985 60
Special field investigation	4 32	2,073 95	395 29	4 80	2,478 36
Hatcheries	6,575 90	19,114 43	1,898 22	286 09	27,874 64
Hatcheries, additions and betterments				19,759 94	19,759 94
Automobiles	947 80		372 69		1,320 49
Rent			79 70		79 70
Total fish culture	$7,548 23	$23,098 36	$2,817 00	$20,053 92	$53,517 51
Screens, ladders and pollution:					
Chief and assistants	$2 51	$1,905 00	$493 76		$2,401 27
Game propagation:					
Game farm	$423 28	$1,882 04	$381 21	$205 12	$2,891 65
License commissions			$19,404 40		$19,404 40
Total expenditures	$13,541 71	$96,500 51	$68,437 35	$21,199 67	$199,679 24

CALIFORNIA FRESH FISHERY PRODUCTS FOR MONTHS OF OCTOBER, NOVEMBER AND DECEMBER, 1926.

Compiled by Fish and Game Commission, Department of Commercial Fisheries.

Species of fish	Del Norte Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Sacramento, San Joaquin	Alameda, Contra Costa	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego, Imperial	Total	Mexican, brought into California via San Pedro	Mexican, brought into California via San Diego	Total Mexican brought into California
Albacore								120	116,835		4,192		81	121,228		60	60
Anchovies									450		2,664			3,114			
Barracuda									21,318	4,759	71,647	6	51,909	149,639	442,918	97,387	540,305
Bluefish																	
Boccaccio																	
Bonito									1,233		220,085	10	11,777	234,005	110,756	13,576	124,332
Carp				658	4,881	1,850					8,657			16,046			
Catfish		13,483		11	45,649	28,816								87,989			
Chilipepper																	
Cultus Cod	323	10,140					103,758	13,651	37,944	221	35			166,032			
Dolphin																3,145	3,145
Eels																	
Flounders	2,258	83,690				429	125,350	9,695	8		210			221,640			
Grayfish							71,140	2,955			7,807		33,766	115,668			
Greenfish																	
Hake							4,427							4,427			
Halibut	30,267						4,772	257	162	60,218	52,076	1,064	9,913	158,729		19,868	19,868
Hardhead					21,247									21,247			
Herring	626		8,143			470	61,054						11,874	82,167			
Kingfish							16,280	10,044	11,188		119,190	18	2,429	159,149			
Mackerel								933	192,787	40	652,470	23,831	126,815	996,876		10,271	10,271
Mackerel, Horse									30,664		96,882			127,546	1,378		1,378
Mullet												481	3,389	3,870		5,475	5,475
Perch	1,064	115	5,843			11	14,643	1,675		218	21,792	42	328	45,731	497	2,580	3,077
Pike				48	711	619								1,378			
Pompano											1,029			1,029			
Rock Bass										60	57,238	24,520	15,894	97,712	260	40,119	40,379
Rockfish	45,688	1,041					154,337	281,509	290,902	29,386	845,598	5,073	197,958	1,851,492		2,224	2,224
Sablefish							31,843		1,961	129	477	20		34,430			
Salmon	112,904			20,097	21,235	12,174								166,410			
Sanddabs		11,700					215,112	16,610	532		3,344	5		247,303			
Sardines							4,381,665	1,500	59,716,924		27,101,134		102,696	91,303,919			
Sculpin											28,896	88	2,373	31,357			
Sea Bass—Black										878	6,498	3,876	26,905	38,157	3,306	106,586	109,892
Sea Bass—White			969				29,908	735	24,392	39,610	26,035	554	42,506	164,709	165,710	75,311	241,021
Sea Trout																	
Shad				4,598	40	4,729								9,367			
Shad—Buck						86								86			
Shad—Roe																	

Sheepshead										739	49,672	2,596	16,893	69,900		1,250	1,250
Skates		1,950					47,060	8,035	50		1,079			58,174			
Skipjack									554		1,417,794		202,140	1,620,488	1,904,734	1,524,533	3,429,267
Smelt	7,578		7,056				4,408	15,225	9,591	1,747	118,090	103,935	356	267,986	270	345	615
Sole		59,260					2,002,915	139,688	2,125	20,395	1,780	456	609	2,227,228			
Splittail					1,492	331								1,793			
Striped Bass			115	27,651	31,880	77,559	455							137,660			
Stingaree																	
Suckers						11								11			
Surf Fish																	
Swordfish											2,240		14,349	16,589		305	305
Tomcod																	
Trout—Farm																	
Trout—Steelhead																	
Tuna																	
Tuna—Bluefin																	
Tuna—Yellowfin											162,726	58	171,919	334,703	1,743,392	1,425,731	3,169,123
Turbot			71											71			
Whitebait			55				100							155			
Whitefish											79,725	62	10,930	90,717		18,260	18,260
Yellowtail										517	101,069	262	222,421	324,269	140,807	674,667	815,474
Miscellaneous			28	138	37	411	1,190	423	4,009	2,236	34,247	1,201		44,220	917	710	1,627
Total fish	200,708	181,379	22,280	53,201	127,142	127,526	7,270,717	503,055	60,463,589	161,153	31,297,278	168,158	1,280,230	101,856,416	4,514,945	4,022,403	8,537,348
Crustaceans—																	
Crabs	[1]35,112	[2]144	[3]144				[5]825,720	[7]15,480	[8]312					[9]876,912			
Ecrevisse																	
Shrimps			284,158				87,640							371,798			
Spiny Lobsters										50,557	142,010	17,069	151,506	361,142		424,794	424,794
Mollusks—																	
Abalones									378,423	6,046				384,469			
Clams—Cockle		15	1,167											1,182			
Clams—Mixed	4,411		2,856											7,267			
Clams—Pismo										54,825				54,825			
Clams—Softshell		717	26,190			15,970	9,380							52,257			
Cuttlefish	40						36	266	5,272		66			5,680			
Limpets																	
Mussels							2,506		480					2,986			
Oysters—Eastern			[4]13,608				[6]253,110							[10]266,718			
Oysters—Native																	
Snails																	
Squid									87,732					87,732			
Miscellaneous—																	
Frogs																	
Terrapins																	
Turtles																	
Totals	240,271	182,255	350,403	53,201	127,142	143,496	8,449,109	518,801	60,935,808	272,581	31,439,354	185,227	1,431,736	104,329,384	4,514,945	4,447,197	8,962,142

All amounts shown in pounds unless otherwise specified. Albacore and skipjack cleaned.

[1] 1,463 dozen. [2] 6 dozen. [3] 6 dozen. [4] 61,858 shell oysters. [5] 34,405 dozen. [6] 1,150,500 shell oysters. [7] 645 dozen. [8] 13 dozen. [9] 36,538 dozen. [10] 1,212,358 shell oysters.

50629 4-27 7500

A CORRECTION.

In the January, 1927, issue of CALIFORNIA FISH AND GAME, the California Fresh Fishery Products Report for the months of July, August and September, which appeared in the January issue should be corrected to read as follows:

Del Norte-Humboldt Counties: Salmon 1,522,388 lbs.; total 1,770,408 lbs.

Marin County: Perch 8,611 lbs., Sea Bass, White, 42,946 lbs., Smelt 6,272 lbs.; total 420,744 lbs.

Solano-Yolo Counties: Salmon corrected to 187,809 lbs.; total catch for district 192,992 lbs.

Sacramento-San Joaquin Counties: Catfish corrected to 20,041 lbs., Salmon 245,134 lbs.; total catch for district 268,131 lbs.

Alameda-Contra Costa Counties: Salmon 385,128 lbs., Striped bass 73,493 lbs.; total 498,679 lbs.

San Francisco-San Mateo Counties: Mussels 3,259 lbs.; total 4,963,484 lbs.

These corrections were made on account of delayed reports having reached this office after the original report was made up for publication.

CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

Volume 13 SACRAMENTO, JULY, 1927 Number 3

CONTENTS.

		Page
HISTORY OF FISH PLANTING IN CALIFORNIA	*W. H. Shebley*	163
FOUR NEW HATCHERIES FOR CALIFORNIA	*W. H. Shebley*	174
HUNTING AND FISHING REMINISCENCES	*Walter R. Welch*	180
FOOD HABITS OF THE CHINESE PHEASANT	*August Bade*	184
RECENT LEGISLATION		188
EDITORIALS		192
COMMISSION ACTIVITIES		211
COMMERCIAL FISHERY NOTES		216
LIFE HISTORY NOTES		220
CONSERVATION IN OTHER STATES		222
REPORTS—		
Violations of Fish and Game Laws		226
Statement of Expenditures		228
Fishery Products, January to March, 1927		229

HISTORY OF FISH PLANTING IN CALIFORNIA.*

By W. H. SHEBLEY, in Charge Fish Culture.

The work of planting and distributing fish in California began immediately after the Fish Commission of this state was organized. The California Fish Commission was created by an act of the legislature in 1870.

*An address delivered at the second annual convention of the Fish and Game Commission.

The act provided for a board of three commissioners to be appointed by the governor. Their duties were defined in the act as follows, "to provide for the restoration and preservation of fish in the waters of the state."

The members of the first board were Messrs. B. B. Redding, S. R. Throckmorton and J. D. Farwell. The first work of the newly appointed Commission was the introduction and acclimatizing of exotic species of fishes. Prior to the time and during the first few years of the Commission's activities, the California Acclimatizing Society had endeavored to introduce the eastern brook trout into California. Their first hatchery was established in the city of San Francisco near where the old city hall stood. This first hatchery in California was erected and operated by the Acclimatizing Society, but owing to impurities in the water, high temperature and the lack of knowledge of how eggs should be handled, the efforts to raise fish were a failure.

In 1872, the California Fish Commission employed J. G. Woodbury, who had been employed by the Acclimatizing Society, to cooperate with the United States Fish Commission (as the Bureau of Fisheries was first named), which had recently been created by a joint resolution of congress and approved by the President February 9, 1871. Mr. Woodbury was instructed to cooperate with the Federal Fish Commission and acclimatizing societies in the eastern states in an effort to introduce food and game fishes into the waters of California.

During 1871, the Fish Commission had procured the services of Seth Green of New York, one of the first and best fish-culturists in the United States, who with Dr. Livingston Stone and others were making their first experiments in fish-cultural operations in our eastern states. The first shipment of live fish to be delivered in California was a consignment of shad fry. These were transported across the continent in barrels. The shipment consisted of 12,000 shad fry from the Hudson River, New York, and was in charge of Seth Green and his assistants. Contrary to statements often made, they were consigned to the California Fish Commission, who arranged for the shipment to be delivered in California waters and paid all expenses. This shipment of shad fry left Albany, New York, on June 19, and arrived in Sacramento on June 26. They were taken from Sacramento and distributed near Tehama.

According to the reports and statements made by Mr. Woodbury to the writer in later years, there were only two thousand of these fish lost in transit. Approximately 10,000 of them were in good condition when planted near Tehama eight days after leaving New York state. Those who have handled shad know that they are considered a delicate fish, yet they were transported across the continent with a loss of only $16\frac{2}{3}$ per cent. We have persons in California who make the statement that many of our hatcheries are too far from the waters to be stocked. It is true that the farther fish are carried, the greater the loss, but the experience of trained fish culturists who have made a success of their distribution work, indicates that if instructions are carried out, there is not a place in California where fish can not be delivered with a minimum loss, if proper care is given the fish.

From 1871 to 1908, fifteen species of food and game fishes were introduced into the waters of this state. The time is too short to go into detail on the history of the introduction of all the fishes. Several species were introduced, but did not thrive. However we now have fifteen foreign

or exotic species thriving in California that are the result of the Commission's work.

One of the notable events in this line of work was the introduction of the striped bass which is no doubt the finest game and food fish in the state. S. R. Throckmorton, a member of the Commission in 1879, recommended to the board that striped bass be introduced into California waters from his native state, New York. The board, accordingly, took the matter up with Professor Spencer F. Baird, then United States Commissioner of Fisheries. As a result of this correspondence, Dr. Livingston Stone was instructed to transport a shipment of striped bass to California. Dr. Stone, at that time one of the leading fish-culturists of the world, collected from the Navesink River in New Jersey, 133 striped bass averaging about one and one-half inches to four or five

FIG. 31. Front view of the Yosemite Hatchery. Photograph by H. C. Bryant, June 3, 1927.

inches in length. Twenty-five of these died enroute. The remainder or about one hundred were planted in the Straits of Carquinez near Martinez. Several of these fish were caught during the first year in the lower waters of San Francisco Bay. A number were caught the following year.

The Commission was very desirous of getting this fish introduced into the waters of California and not being certain that the first shipment was increasing, decided to send J. G. Woodbury east after another shipment. In June, 1882, Mr. Woodbury proceeded to New Jersey and in cooperation with Seth Green, superintendent of Fish Culture for the New York Commission, caught 600 striped bass averaging six and one-half inches in length from the Shressbury River, New Jersey, near Red

Bank, where Dr. Stone had caught the first shipment above mentioned. There was a loss in the live cars before the start was made for California.

On July 17, 1882, Mr. Woodbury and his assistants left Red Bank, New Jersey, with 450 striped bass carrying them in what was known as the "New York can" having a capacity of 14 gallons of water. These cans had been designed by the fish-culturists of the state of New York for the transportation of trout. Mr. Woodbury had twelve cans of this type made for use on this trip. On July 25, he arrived with approximately 300 striped bass at Army Point in Suisun Bay where they were liberated from the cans. This shipment, and possibly some that survived the shipment made by Dr. Stone, was all the stock required to introduce into the waters of California a fish of great commercial value as well as one affording anglers fine sport.

In transporting these striped bass from Red Bank, New Jersey, to Suisun Bay, the attendants were busy the entire time. The water was aerated every fifteen or twenty minutes during the time the fish were in transit by an aerator contrived by Munroe Green, a brother of Seth Green, who was also an eminent fish-culturist of his day. The aerator was a cylinder about 18 inches long and six inches in diameter with a convex bottom which was perforated with fine holes. The top was arranged with a lid and a handle to manipulate it. There was a spike-like point projecting from the center of the perforated end so that when it was inserted into the cans the fish would not be mashed or crushed. By letting this cylinder or tube into the cans and pushing it slowly to the bottom until it was filled with water, then quickly removing it to the top of the fish can, a fine shower of water was produced that poured back into the can. This was well oxygenated and prevented the heavy impact of the falling water which is more or less injurious to fish on long journeys. The writer was presented with this aerator and used it continually for ten years in distributing fish in California. We also had others made with an improvement on the original invention of Munroe Green. These aerators are a great advantage over dippers as they do not cause such a heavy volume of water to descend on the delicate fish. Some people do not recognize the importance of preventing the fish from receiving undue concussion as I understand that it has been claimed that young salmon and trout can be dropped over a dam two hundred feet or more in height without doing them any injury.

Before the 14-gallon "New York can" was used in California, a number of different type cans had been purchased from some of the commissions in the eastern states and also some furnished by the United States Fish Commission. One type of can that was recommended by the Federal Commission was made of medium light tin and reinforced or jacketed with a wood exterior to keep the can cool. This type of can was used in distributing fish from the San Leandro Hatchery and from the Shebley Hatchery in Nevada County. It held approximately ten gallons of water and did good service for a number of years. It was serviceable when handled by the hatchery men, but railroad employees and others handled it so roughly that a heavier can was decided on.

Another can that was in use by the United States Fish Commission and a number of the eastern commissions was made with straight sides. The top was fastened on hinges and made to fit tightly when in place with a clasp. To prevent the water from spilling through the

rim of the lid there was a groove entirely around the edge in which a heavy rubber band was placed so that the contact between the lid and rim of the can was water tight. The lid had a hole in the center through which a pipe or tube was inserted and air was forced through the pipe or tube by the use of small bellows such as those used in coal grates to start the fires burning. There were many other patents and inventions of different types of cans, but they were not practical. One inventor had a box patented that would carry fish without an attendant. It was so arranged that the movement of the train or whatever vehicle was used, would cause the water to splash through a perforated plate on the bottom of an ice chamber. Thus the water would be aerated as well as kept cool. No provision was made for delays when the train was not in motion. One of our Commissioners was so carried away with the idea that he ordered ten or a dozen of these cans in spite of our protests that an attendant would have to accompany the fish to give them the proper care and aerate the water if the train should stop over 15 minutes at one time. To convince the Commissioner that our experience in handling fish was of some value, we insisted that he have a shipment made without an attendant. This he agreed to, and a shipment of trout was sent out with instructions that they were not to be interfered with until they arrived at their destination. As was to be expected, all the fish were dead on arrival. We heard no more about the self-aerating cans.

Cans charged with oxygen gas have been tried in Europe as long ago as 1890. The plan has also been tried out in this country. While the fish can be carried by this method, these plans are not practical. Cans with an air chamber charged with compressed air have been quite successful, but they are expensive. In the judgment of the writer, an attendant skilled in the handling of fish should accompany all shipments, at least until the fish leave the railroads.

The different sizes that fish should be held until shipped has been a matter of controversy and argument for the last fifty years as reports of the different states and governments as well as in our own state records show. The writer, who probably has handled as many fish personally as any fish-culturist in the United States, and some of our experienced fish-culturists are practically agreed on the size fish that carry the best. That is when they are two or three months old, before they become too soft and fat and fatty degeneration of the vital organs takes place. When older fish are shipped they have to be starved to get them in condition to ship and this takes time. As they are naturally larger a smaller number must necessarily be carried in the cans and consequently there is an added expense with no appreciable gain in results. We have shipped yearlings and fish at all ages, but medium sized fingerlings carry better than larger fish and if given a wide distribution, are sure to give good results. By a wide distribution, I mean the way we use to distribute the fish by depositing them on the ripples and in shallow water, five thousand to ten thousand to a mile of ordinary sized trout stream. For example, in a stream running fifty second-feet of water, ten thousand fingerlings to a mile would be an ample stock. For a period of ten years, the writer planted practically all the fish that were shipped from our hatcheries and had an opportunity to check on the results.

In the early days of the introduction of new species of fishes and in the stocking of depleted streams, the Commission selected the waters

to be stocked and had the fish planted by their fish-culturists. A great many lakes and streams in this state were stocked where the waters were depleted of their fish life and new species introduced and endeavors made to stock lakes and streams which experiments proved were not suited for certain species.

Some of the notable examples of fish planting and the introduction of new species are among the following: The Truckee River was stocked by the Commission with rainbow trout from McCloud and Klamath rivers, also with rainbow fry hatched from eggs collected from Goose Lake, Modoc County. The first rainbow trout introduced in the Truckee River were from eggs collected on the McCloud River. Later the Klamath River fish were introduced and before the Klamath River fry were planted, fry hatched from eggs collected from Goose Lake were introduced into the Truckee River. The upper reaches of Truckee River

FIG. 32. The new Burney Creek Hatchery, Siskiyou County, built by the Pacific Gas and Electric Company. Photograph by George McCloud, April 24, 1927.

near the outlet of Lake Tahoe were stocked with Loch Leven trout twenty-five years ago when it was found that no other species would remain in that part of the river owing to the fluctuating flow of water caused by the opening and closing of the gates at the outlet to the lake.

Bear Lake, San Bernardino County, was stocked with rainbow trout and black spotted trout transported from the Nevada County hatcheries to San Bernardino by rail to Colton and from Colton via team and pack train over the Santa Ana River trail in 1885 which was before there was any road up Mill Creek Canyon. The only road reaching the lake at that time was by desert via Victorville, which was too hot and the distance too great to make by team. It took four days and nights from the time the fish left the hatchery in charge of the writer, until they were deposited in the lake. Out of twelve cans the loss on this trip

was less than 8 per cent. Later a number of other shipments of Klamath River trout were planted in Bear Lake. The entire region above Yosemite Valley was stocked with fish from the state hatcheries. The first shipment planted in Merced Lake, Lake Ostrander and Bridal Veil Creek was in the fall of 1892. The shipment consisted of eastern brook trout, black spotted trout and rainbow trout. These fish were hatched at Sisson Hatchery, now known as Mt. Shasta Hatchery, transported by rail to Raymond, then by horse teams to Wawona. They were taken from Wawona to Mono Meadows, the farthest point the army ambulance wagons could proceed. They were then transferred to army pack mules and conveyed to the waters to be stocked. The writer had charge of this shipment and the loss from the hatchery to the lakes and streams was less than 10 per cent. This was a hard trip not only on the fish but the attendant, and it was considered a remarkable example of fish distribution at that time as the United States Fish Commission had advised our board that in the judgment of their fish experts the trip could not be made without a total loss of all the fish.

At that time the Merced River was free of obstructions and the steelhead and salmon ascended the Merced River to Wawona and into Yosemite Valley as far as the rapids below the Vernal Nevada Falls. There were a few low dams in the river, but they were not high enough to prevent the steelhead and salmon passing them during the spring floods.

Hundreds of lakes and streams were stocked during the period from 1871 to 1893 by the Commission without outside assistance. The practice was for the board to write letters to prominent citizens in different parts of the state, to county officials and members of the legislature, asking them to recommend streams and lakes which were in need of stocking. On receipt of answers to these letters, they were given due consideration and the board consulted with their fish-culturists and made the allotments according to what their judgment deemed best for the waters requested to be stocked.

About 1893 the Commission realized that the work of stocking streams required the assistance of railroads and citizens interested in keeping up the fish supply in the streams and lakes. Accordingly, application blanks were gotten up following the same form generally as was being used by the eastern commissions and the United States Fish Commission. These blanks were mailed out to residents of the different parts of the state where the waters needed stocking because of overfishing. The name of the applicant was required, the names of the waters to be stocked, the nearest railroad station to point of planting and a statement from the applicant that all expenses of team hire, ice and expense of attendants were to be borne by the persons making application for the fish. When these applications were filled out, the fish were allotted and the planters from hatcheries made the distribution.

In 1890, the Southern Pacific Railroad Company issued the first free transportation for local work. They gave annual passes to J. G. Woodbury, E. W. Hunt and the writer so that the distribution of the fish could be made without expense to the state. Prior to this time, all the shipments were made by express and the exorbitant rate of expressage and the small sum that the legislature appropriated for the work of

the Commission, necessarily caused the number of fish to be planted to be reduced to a small number.

The writer, accompanied by Mr. Woodbury, then superintendent of Fish Culture or Superintendent of Hatcheries as was his official title, went to the office of Collis P. Huntington, and made a request for annual passes with the privilege of transporting fish free of charge in the baggage cars. Mr. Huntington replied, asking "Why should we carry fish free of charge for the state?" When it was explained to him that the tourist travel depended on keeping the lakes and streams well stocked with fish, he said he would have the matter investigated and if it was of benefit to the company, he would help us out. A few days later I called on him and he gave me the passes and told me that they would be pleased to assist us in having the passenger trains stopped at any point where we desired to put off fish, whether it was a regular station or not. The Southern Pacific Railroad has been giving us transportation ever since as have all of the other roads. This was somewhat different from when we shipped our fish during the period from 1884 to this date, when we were often four or five days on a freight train in a box car with 12 or 15 cans of fish. I recall an instance in 1885 when a shipment of trout consigned to the streams of Santa Clara County were five days en route from Colfax, Placer County, to San Jose. The railroad gave the Commission a special rate on a box car. The fish, ice and aerators were placed in the box car at Colfax. The fish had been raised in the hatchery on my father's place in Nevada County and transported on the narrow gauge railroad to Colfax. Here they were placed in the box car with the attendants. Twenty-four hours later the consignment of fish reached Oakland and the box car placed on a siding for two days and then picked up and hauled to San Jose where the fish arrived in the early morning, the fifth day after leaving the hatchery. Even on this long trip the loss was not great. The citizens of San Jose conveyed the fish to the streams and considered the work well done under the circumstances.

Beginning with 1893, the Commission broadened its distribution of the trout from our hatcheries. The writer had become familiar with all the important lakes and streams, having been on the road every season planting fish and making investigations for the previous nine years. A planting program was arranged with the assistance of J. P. Babcock and others interested in fish-cultural work. He was placed in charge of the Sisson Hatchery where plans were made to enlarge and improve the station. In 1895, R. W. Requa, who had been working under G. H. Lambson in the car messenger service of the United States Fish Commission for a number of years, was employed as shipper or fish planter for our Commission. With instructions regarding locations of streams and lakes and with the assistance of sportsmen's clubs, many private individuals, who had become interested in certain lakes and streams, and the deputies, the trout in California were given a wide distribution in depleted lakes and streams and hundreds of lakes and streams that were barren of fish life were stocked.

As the demand for trout became greater, the Commission issued an application blank, so that when persons or associations requested fish for a certain stream or lake, all necessary information could be had regarding the waters desired to be stocked, the point on the railroads where the fish were to be delivered and whether the waters were

open to the public for fishing purposes. Prior to 1916 when the Fresno administration office was abolished, the fish planting work received valuable assistance from A. D. Ferguson and the deputies in the Fresno division. Many hundreds of lakes and streams were stocked by the deputies under the direction of Andy Ferguson. The late S. L. N. Ellis took great interest in fish planting in the southern range as well as other deputies. Among those who assisted in this work that are now in the employ of the Commission are deputies Edward Smalley, F. A. Bullard and others, not overlooking the able assistance given the Department of Fish Culture in past years by deputies H. I. Pritchard when he was in charge of the Los Angeles office, J. H. Gyger, Webb Toms and others. Some of the old timers now passed to their reward gave this work their particular attention by meeting the more important shipments of fish in their districts and assisting in the work.

FIG. 33. The new Fern Creek Hatchery in Mono County, erected 1926. Photograph by George McCloud, April, 1927.

The late Henry J. Abels supervised the distribution work in Santa Barbara County for nearly 20 years and there never was a complaint from his district. The game wardens have always been of assistance wherever their services were required in fish distribution work.

As the demand for fish increased with the ever-increasing population of the state and the capacity of the baggage cars on the different railroads was often overcrowded with fish cans, the Commission, in 1907, requested an appropriation from the thirty-seventh session of the legislature to purchase and equip a fish distribution car. The appropriation was passed and through the courtesy of E. E. Calvin, general manager of the Southern Pacific Railroad, we were enabled to purchase a 60-foot baggage car. The car was placed in the shops at Sacramento and an engine, air compressor, air pipes, liberators, etc., was installed. The car has a capacity of from 100 to 110 cans and when placed on the road twenty years ago was one of the best equipped fish cars in the world. The car is now old and as many new ideas have been evolved since that date, a new and more modern car should be built as soon as funds are

available. In fact the Commission should have two modern steel fish distributing cars built at an early date. In 1915, we rented a baggage car from the Southern Pacific Railroad Company and equipped it with an aerating system, with the air pumps driven by a gasoline engine. This car has been in use each season for the last eleven years. We have to return the car to the company at the end of the distribution season and are under the expense of removing the engine and equipment and installing the same again the following spring.

In conjunction with the distribution system on the railroads, the Commission operates nine hatcheries where the fish are planted by the hatchery foremen and crews by the use of trucks. These fish are always delivered in good condition as the trips are short and the fish are carried on trucks and can be given better care. These are mostly small hatcheries that are used to furnish a supply of fish for nearby streams and lakes. In a number of the counties where the mountainous regions are inaccessible to trucks or wagons, the fish are transported by pack animals. Cans were built for this purpose which were box shaped about 30 inches long and about one foot wide with the mouth of the can inclined to one side so the lids could be removed, the fish examined and the water changed or reiced.

The Fresno Division has a collapsible container made of canvas that was used successfully on some of the long hard trips in the high Sierra range.

A change in the methods of transporting trout has become necessary since the use of auto trucks and paved highways on which the cans are carried over the greater part of the distances from the railroad stations and the hatcheries. In past years when fish were being conveyed to the waters to be stocked by wagons over unimproved mountain roads, the jolting of the wagons caused the water to splash against the sides and breasts of the cans and thus gave sufficient aeration in transporting fish. All that the attendants had to do was to ice the cans so as to keep the water at the proper temperature during the time the wagons or trucks were moving. But this can no longer be done. The smooth paved highways and the use of auto trucks does not cause as much agitation of the water in the cans as the motion of a baggage car on an express train. So it is necessary in transporting the fish, after they leave the fish distributing cars or the hatcheries, to so place the cans that they can be aerated every 20 or 30 minutes, otherwise the fish will smother or die from lack of oxygen. This is not a hard matter to do, as the time of delivery to the average stream or lake where the waters are to be stocked has been reduced to such an extent that it is no longer a hardship such as we had to endure in the years before the advent of the auto truck for the distribution work. Many of our trips twenty-five and thirty years ago would take from 24 to 30 hours after leaving the railroad, as the average time of the heavy freight or even delivery wagons did not exceed three or four miles an hour when ascending mountain grades. Now the auto truck speeds along at the rate of 15 to 25 miles an hour and the destination point is soon reached.

Attention to all this has been stressed in our instructions to persons transporting and planting fish. A number of the applicants carrying out the instructions and suggestions have constructed rest ponds where the fish may be held for a period of five or ten days at the end of roads accessible for travel by auto truck. The fish placed in such ponds are

then distributed at leisure, generally by pack animals to the more remote and inaccessible lakes and streams in higher ranges of the mountains. This system of giving the fish a rest after the long journey by distribution car and auto truck is very beneficial as they are then in fine condition for pack animal trips to waters that they are consigned to, otherwise if they were transferred directly to the pack animals, they would not carry so well. Some planters rest their fish in the streams by tying bobbinet or mosquito netting over the mouths of the cans and placing them on their sides in the bed of the stream so that there will be a constant flow of fresh water into the cans and this gives the fish a chance to recuperate. They can then be carried on for many miles without any appreciable loss.

In transporting live fish, there is more or less loss. For in every shipment there are weaklings caused by structural defects in the embryos

FIG. 34. Rush Creek Egg Collection Station, a fertile source of black-spotted trout eggs. Photograph by George McCloud, April, 1927.

before hatching and as among all living things, these must of necessity die. Some die in the early stages.

People do not realize the number of cans required to ship from 25,000,000 to 30,000,000 trout from the different hatcheries. During 1925 there was shipped approximately 17,000 cans of trout to the different streams and lakes in this state. Outside of two or three unavoidable losses the fish were planted with the normal loss that takes place in handling trout during the distribution season. There is a tendency, or we might call it an atavistic interest in all wild life, perhaps inherited from our ancestors, to pay more attention to fish or game than to any other thing with which we come in contact. I have noticed it hundreds of times where persons are visiting a hatchery or where someone is planting fish. Fifty dead fish attract more attention than 10,000 strong, healthy fish. I have had intelligent men and women while visiting hatcheries where I have been in charge and where there were millions of strong healthy fish notice a hundred or two weak or dead

ones that had not been removed from the troughs and make severe criticisms regarding the incompetency of the fish-culturists or the superintendents. I recollect occasions where some member of the crew had kindly taken one-half hour or an hour to show visitors around the ponds and hatcheries, explaining in detail how the work of propagating and rearing fish was carried on, and as soon as the employee returned to his work, someone in the party would come into the office and ask me if I was aware of the fact that there were two or three dead fish in some pond or trough that had not been removed. I always replied that fish were subject to disease and death the same as all living things and that in proportion to the numbers handled, the average death rate, when there were no epidemics, probably was no greater than among the human family. They would always go away with a puzzled look, evidently thinking that there was something wrong or else none of the fish would die. The same is true in the distribution work. If a few hundred fish die en route or they are found where a plant has been made on some lake or stream, the story soon goes the rounds that a whole shipment of fish were lost at such a place. These stories are repeated and like all stories in which somebody has indirect interest are continually told. This often goes on for years.

It is true that shipments have been lost, but very few by the Commission's employees and not as many as is generally supposed by the planters connected with clubs. Then it is a case of not carrying out instructions. Many of the applicants are better qualified to superintend the planting of fish than some of our own men as many of the fish planters, connected with clubs and organizations and individuals have planted fish for many years. We have among our planters connected with clubs, men who have planted and supervised the work in their districts for twenty-five or more years. Several of the young men now applying for fish are the sons of men to whom fish were given years ago with instructions how to plant them and how to do the work properly, and these young applicants are taking the same keen interest in this work as the generation before them.

I mention these facts as they all have an interest in the history of fish distribution in California. I can not give more than a brief outline of this work as it would take a book of several hundred pages to cover the subject thoroughly. A complete record would be of interest to all sportsmen and others interested in fish planting work in California, provided all of the more interesting phases of the work were written up. All that I can say in conclusion is that we have accomplished more than the general public will ever realize or care to realize, and when I say we I include all of our commissioners, deputies, fish-culturists and those who have cooperated in this great work. Throughout the years a strong loyal force of employees on the Commission, has, for inadequate pay, done a big work for our state and I hope that the future years will be as fruitful in results as the past.

FOUR NEW HATCHERIES FOR CALIFORNIA.

By W. H. Shebley.

During the last year the California Fish and Game Commission has had constructed four new hatcheries. These are located in regions where fish cultural problems were a serious question and very much needed.

The new Burney Creek Hatchery is situated on Burney Creek in Shasta County, one mile below the beautiful Burney Creek Falls in Burney Creek State Park. The Yosemite Hatchery is located in the famous Yosemite Valley, the Big Creek Hatchery, in Santa Cruz County, is on Big Creek, which has its source on the borders of the California State Redwood Park, and the Fern Creek Hatchery, on June Lake, Mono County.

BIG CREEK HATCHERY.

Millions of steelhead eggs have been hatched in the past at the Brookdale Hatchery and the resulting fish planted in the streams of Santa Cruz County and other contiguous counties. But the Brookdale Hatchery has of late become a considerable problem. Its water supply has been a continual source of trouble. Each season the water put to a domestic use by the residents of Brookdale in their summer cottages greatly reduces both Alba and Clear creeks, where the hatchery supply is obtained. This matter was taken some years ago before the Railroad Commission, but it ruled that domestic use was paramount and had to be considered first and that the hatchery had to depend on whatever amount was left in the creeks. Not only has the supply been getting less each season, but the water was being polluted by the trash that worked from hillsides, where the cottages were located, into the creeks. The water was further rendered unsatisfactory by being held in a swimming pool above the hatchery. In the swimming pool the water became very warm and when it was turned into the creek, it caused the temperature of the creek to rise and the development of certain organisms deleterious to fish life.

Under these conditions it was deemed advisable to abandon the Brookdale Hatchery and move to a more favorable location. A lease was obtained on land bordering Big Creek in Santa Cruz County about three-fourths of a mile from Swanton, where the Scott Egg Collecting Station is located. The site consists of approximately five acres. It was obtained through the kindness of R. L. Cardiff, manager of the Coast Counties Gas and Electric Company. The directors of the company also were very kind in giving the state a lease for this desirable site. The hatchery has a capacity of one and one-half million trout and is so arranged that additional troughs can be added when the demand is necessary.

Scott Creek, from which the egg supply will be obtained for Big Creek Hatchery, has furnished many millions of steelhead trout eggs during the last twenty years. When operations to collect steelhead trout eggs from this stream were begun, the run of adult fish, or spawners, was greatly reduced by excessive fishing. The problem was solved several years ago when the legislature created District No. 14 and set aside as a state fish preserve the waters of Scott Creek from their junction with Mill Creek to their mouth in the ocean. This preserve when properly patrolled to prevent poachers from catching the fish planted each season, as well as the spawners on their way from the ocean to the trap at Swanton, will furnish an average of three million eggs each season. At present there is a special patrolman on this creek whose duty it is to watch for persons attempting to take fish from the stream as well as to see that the pumping plants are properly screened and the screens kept in place at all times when the pumps are in operation.

At the time the legislature passed the law creating a fish preserve of Scott Creek, there were no diversions of water below the traps in the area where the fingerlings were distributed, but since this time the Division of Water Rights has granted several appropriations for pumping plants, the water to be used for irrigation. This has had a serious effect on the young of the steelhead trout. Indeed, during seasons of drought the greater part of the water of Scott Creek has been used for irrigation to the unquestionable detriment of the small fish. It has always been an open question in the Department of Fish Culture as to the legality of water diversions. The legislature, in setting Scott Creek aside as a fish preserve, certainly did not intend to allow the water to be diverted for other purposes. A fish preserve without water would be like a game preserve without forests or brush fields, only to a greater extent, for animals possibly could live for a time without forests or brush fields, but it is certain that fish can not live without water. If some agreement

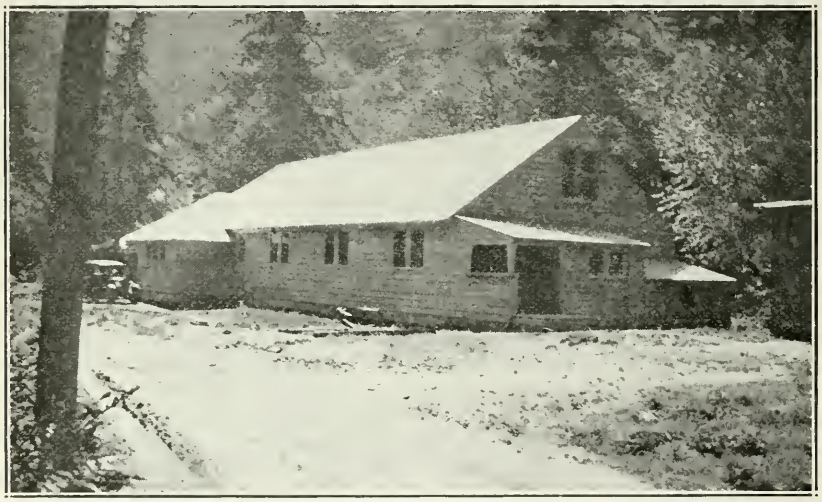


FIG. 35. The new Big Creek Hatchery, Santa Cruz County, built to replace the Brookdale Hatchery.

can be reached this condition will be improved, but during seasons of drought the problem is and has been serious.

Distribution can be made by truck to all the principal streams in Santa Cruz County as the hatchery is but three quarters of a mile from the highway skirting the coast. In fact easy delivery can be made to waters of Monterey County and to points as far north as San Mateo and Alameda counties.

BURNEY CREEK HATCHERY.

The Pacific Gas and Electric Company in the development of their Pit River hydro-electric projects planned several dams that would prevent the movements of the migratory trout and salmon to the upper reaches of the Pit River and to the large tributary streams, namely Burney Creek, Hat Creek, Clark Creek, Salmon Creek and others.

After the completion of the dam for Pit Power Plant No. 3, a survey of the Pit River region was made by the Department of Fish Culture to determine the best location for a hatchery to be built in lieu of fishways to furnish fish for the upper reaches of Pit River and its tributaries as well as for the lakes that would be created by the damming up of the water for the different power projects.

After an extensive study, a location on Burney Creek, near the dam for Pit Power Plant No. 3, forming Lake Britton, was selected as the best site for the hatchery. Lake Britton is formed by a dam approximately 125 feet high constructed across Pit River about two miles below the mouth of Burney Creek. The lake is approximately nine miles long. Hat Creek flows into the lake near its head. Burney, Clark and Salmon creeks and other smaller streams also flow into the lake. The

FIG. 36. Front view of the new Burney Creek Hatchery, showing hatchery building and superintendent's cottage. Photograph by George McCloud, April 21, 1927.

hatchery site is one-half mile from the shores of Lake Britton on a flat on the west bank of Burney Creek on property immediately adjacent to the boundary line of Burney Creek State Park.

Plans were made for a hatchery with a capacity of three and one-half million fish, so arranged that additional hatchery equipment could be annexed as occasions may demand. These plans were submitted to the Pacific Gas and Electric Company last fall and met with their approval. They began work on the buildings almost immediately. The station was completed during May and consists of a hatchery building with living quarters upstairs for some of the help, a superintendent's cottage, garage, feed preparing room, all completely equipped for next season's operations. The buildings are all substantially built and are a credit to the company. No expense in material or labor in the construction of this station was spared and its capacity will not only keep up the supply of trout in the Pit River region, but will afford enough fish to

supply other parts of the northern and eastern parts of the state when the station is in full operation.

Plans are being formulated for the installation of salmon racks and traps near Hagan Flat which is farther down the river and below the proposed power plants. Here the eggs of the salmon can be collected and transported to Burney Creek Hatchery, there to be hatched and the resulting fish transported by trucks to a point below the last diversion on Pit River or below the lowest power house and there distributed. The Hagan Flat project will be an auxiliary to the Burney Creek Hatchery. Thus both salmon and trout will be hatched there.

Eventually the entire Pit River canyon as far as the mouth of the McCloud will be developed for power purposes. The dam forming Lake Britton is to be built across Pit River about two miles below the mouth of Burney Creek and the water diverted through a tunnel to Pit Power House No. 3, diverting approximately the whole river for a distance of nine miles.

Pit Power House No. 4 will be located eleven and one-half miles farther down the river. The water will be diverted below Pit Power House No. 3 through a tunnel that will have its outlet opposite Hagan Flat, twenty-three miles from Montgomery Creek village on the state highway. Pit Power Houses Nos. 5 and 6 are contemplated to be built later on farther down the river. These, no doubt, and other hydro-electric projects will be built in the next few years. The Commission can arrange to collect the salmon eggs below any of these projects, by a system of racks and traps, and the eggs transported to Burney Creek Hatchery, if no better site is found later on for a salmon hatchery, when all these projects are developed. For the present, the Burney Creek Hatchery and the Hagan Flat salmon racks and traps will adequately handle the fish problem of the Pit River region.

The fishes common to Pit River are the rainbow trout, ripple pike (*Ptychocheilus oregonensis*), and other members of the minnow family, chinook salmon and suckers. Pit River afforded excellent spawning grounds for the salmon before the construction of the dams and power houses. Excellent trout fishing could also be had from the mouth of the McCloud River to Pit River Falls. The principal tributaries of the Pit River below the falls are McCloud River, Hatchet Creek, Squaw Creek, Montgomery Creek, Roaring Creek, Burney Creek, Rock Creek, Clark Creek, Hat Creek and Salmon Creek. Fall River, which formerly joined the Pit above the falls, is now diverted through a long tunnel and its waters, after passing through Power House No. 1, enter the Pit River a few miles above the head of Lake Britton. Fall River has two species of native trout that are non-migratory. It is proposed to keep all these streams stocked from Burney Creek Hatchery.

YOSEMITE HATCHERY.

During 1919 an experimental hatchery was operated near Happy Isles in the upper end of the Yosemite Valley to determine whether the water from the Merced River flowing through Yosemite Valley was suitable for hatchery purposes. A temporary hatchery was installed and several hundred thousand trout eggs were hatched and developed

into healthy fry. The experiment determined beyond any question that the water was excellent for hatchery purposes. Owing to lack of funds and some provisions in the lease that the then Secretary of Interior insisted on having incorporated, the project for the time was abandoned. Last summer a new lease satisfactory to the Commission was given by the Park Service through the Secretary of the Interior for a period of twenty years. Plans were made by the Department of Public Works for a modern hatchery and work was begun early in the fall of 1926. The hatchery was so near completion by the time eggs were ready for allocation to the different hatcheries that the Commission placed 590,000 steelhead trout eggs in the hatchery. The resulting fry and fingerlings will be reared and distributed in and adjacent to the many lakes and

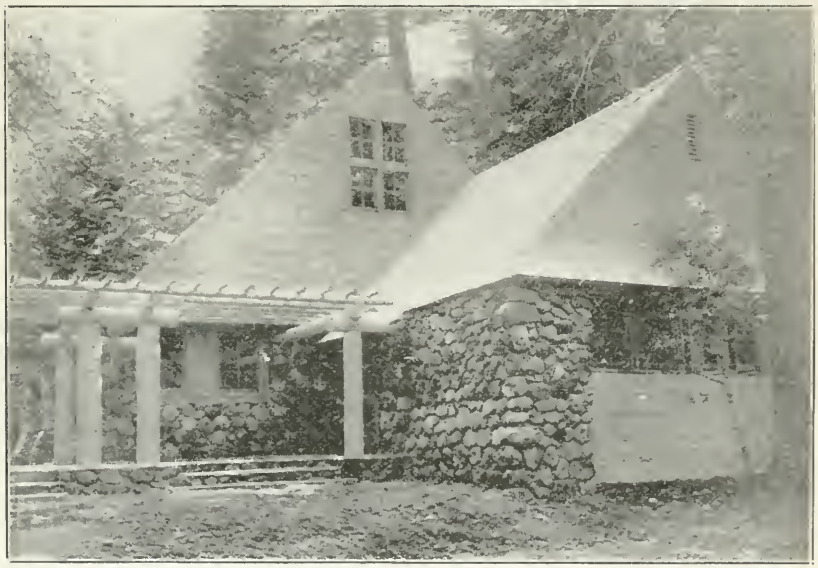


FIG. 37. The Yosemite Hatchery, showing stonework and cedar shingles. Photograph by H. C. Bryant, June 3, 1927.

streams of the Yosemite National Park where thousands of tourists annually spend their vacations.

Investigations will be made during the coming summer to determine whether sufficient eggs can be collected from Lake Eleanor, and other lakes in the park, to supply the hatchery. It is very essential that an adequate supply of eggs be had to furnish the Yosemite Hatchery, because the demand on the lakes and streams of the Yosemite National Park is very great.

During the coming fall and winter, eggs from the fall and winter spawning species will be placed in the hatchery so that the fry will make a fine growth before the eggs of the spring spawning species are shipped to the hatchery.

The Park Service, under the terms of the lease, are to make the distribution of the fish within the boundaries of the park. This will be a

great advantage. The fish can be taken from the hatchery at the proper age and size and distributed to the most remote regions of the park and at a time when conditions are most favorable. Fish for distribution in territory contiguous to the park can be hatched and distributed from Yosemite Hatchery when the hatchery is operated to its full capacity.

The thousands who go to Yosemite each season will find this hatchery both interesting and educational. Indeed, during the short period that the hatchery has been in operation, literally hundreds of visitors have called daily during the visiting hours. It is necessary to have the hatchery closed to visitors part of each day to enable the fish culturists to care for and feed the fish.

The Yosemite Hatchery has a capacity of 1,500,000 eggs and the excellent condition of the water will cause the development of as fine a lot of fish as can be raised in any hatchery in the state. The hatchery will give thousands of persons an opportunity of seeing how fish cultural operations are conducted by the Commission. When the grounds are ornamented, the aquarium completed and full of the different species of fish that are to be found in the Yosemite Park region and visitors can be shown the eggs and embryos, the hatchery will be one of the most attractive places in the Valley.

FERN CREEK HATCHERY.

In the fall of 1926 a fine new hatchery located on June Lake, Mono County, was completed. It is a frame building painted white with a galvanized iron roof. Two cabins are provided for help. This hatchery was designed for the eyeing of steelhead eggs and eastern brook eggs taken in June Lake and eastern brook eggs taken in Gull Lake. The situation has proved very satisfactory as the water which is taken from either, or both, Fern Creek or Reverse Creek is pure and clear. June Lake was first stocked with steelhead trout in 1922 and forty to sixty thousand fingerlings have been planted there annually since. Consequently an abundant supply of steelhead trout for spawning is available. This year the steelhead trout which were seined from the lake averaged from four to five pounds and there were some as large as 10¼ pounds. Well over a million eggs were secured and eyed the past spring. This hatchery, containing thirty-two troughs which will supply the immediate vicinity with fish, is typical of a small local hatchery designed to take care of local plantings.

HUNTING AND FISHING REMINISCENCES.

By Walter R. Welch, Field Assistant.

"Well, Walt! If the boys of the present generation could now enjoy such duck shooting on the old marsh and along the sloughs as you and I had when we were boys, what a time they would have."

Thus remarked Claud Fox of Redwood City during a recent discussion of the past and present wild duck supply and shooting conditions on the marshes along the upper San Francisco Bay.

Claud and I were schoolmates and boyhood friends. During the early eighties, at the request of his father, I took him on his first wild

duck and goose shoot, and consequently, we were companions on many duck hunts.

Claud's remark and our discussion of duck shooting on the marshes over forty years ago caused me to lapse into a reminiscent mood and, at this time, when the protection and conservation of fish, game, song birds and forests is attracting and receiving so much general attention from people throughout the state, I am wondering how many of the present-day generation realize and appreciate the bountiful supply of wild life to be found in this state in what seems to me to be only a few years ago when it could truly be said that "California is a Sportsmen's Paradise."

At that time the lakes, rivers and streams teemed with trout, salmon and other game and food fish; the hills and valleys were alive with quail, deer and other game; the waters of the bays and the sloughs of the marsh lands reflected the glimmering wings of millions of ducks, geese and shore birds; and with very little trouble or expense one could go afield or astream and within a radius of fifty miles of San Francisco and in a few hours, return with a well-filled bag or creel.

In those days, nimrods' name went forth as a "mighty hunter" and the angler was known as "a fisherman." The "tools of the craft" at that time were muzzle-loading shot guns and rifles, a fishing rod was secured from a willow along the bank of the stream, and the reputation of the "hunter" and "fisherman" depended upon the amount of game he killed or the fish he caught.

During the Pioneer days, and even as late as the nineties, fish and game of all species and classes were caught and killed without regard to season, number, size or sex, and were commercialized for dollars and cents in the open markets of the state, and not as it should have been and is at the present time—as a valuable asset and resource of the state for the benefit of the people in general in their pursuit of recreation, pleasure, health and happiness.

The writer was born and raised in California and ever since he was able to "tote" a rod or gun has never missed an opportunity to be afield or astream hunting or fishing.

I became afflicted with "hunt and fishitis" at the age of about eight years, and clearly and distinctly do I recall spending many a moonlit night during the late fall in the early seventies seated in a duck shooting blind on the shore of the lower San Francisco Bay, where is now located the west approach to the Dumbarton Bridge east of Palo Alto.

As evening approached and night drew on, flock after flock—containing thousands of ducks and gaggles of geese by the hundreds—were to be seen on all sides, winging their ways to the grain fields in the vicinity of where are now located the towns of Mayfield, Palo Alto, Menlo Park and Redwood City.

From the mud flats and marshlands bordering the bay shore came the quack of ducks, the honk of geese and cranes, the call of the willet and curlew, the whistle of plover, snipe and shore birds, and the cackle of rail by the thousands upon thousands; while in the grain fields could be seen the flash and heard the report of every kind of "shooting iron" from the old smooth bore army musket with its cap the size of a small plug hat and its iron ramrod, to the 10 gauge muzzle-loading shotgun, loaded with five drams of black powder and one and one-half ounces of

shot. While I don't remember the exact number of ducks and geese I bagged that night, I had all I could carry home.

Being possessed of an insatiable desire to be afield with rod and gun, during the late seventies and at the age of about sixteen years, I secured a small sloop for use as a house boat, and having an old market hunter for a partner, I entered the vocation of hunting ducks, geese and shore birds on the bay and rivers for market; and also grebe for their skins and seal for their oil and skins.

Our equipment as market hunters consisted of a "tule splitter" and scull boat for use on the river and bay, one 12 gauge, one 10 gauge and one 4 gauge shotgun, a 45-70 caliber Winchester rifle, and two hundred brass shotgun shells. Powder and shot were purchased in 50 and 500 pound lots and "primers" and wads in 2500 and 5000 lots.

A good "tule splitter" could be purchased for from $8 to $12 and a fourteen foot round bottom cedar scull boat, with iron center board, cost $70, or at the rate of $5 per foot.

Fig. 38. A mother murdered. An effective exhibit installed by Deputy W. B. Sellmer at the Marin County Fair, August, 1926, and at the Palo Alto Christmas Party. One of the fawns in the picture is alive and the other mounted.

A twenty-five pound keg of "Hazzard's F. F. G." black powder cost from $10 to $12.50; shot could be purchased at from $1.85 to $2 per twenty-five pound sack, and the cost of wads and primers was in proportion.

In "flight duck shooting" on the river, it was not unusual to empty the 200 shotgun shells by noon, and to retrieve from 50 to 100 ducks as a morning's shoot from the "tule splitter." The average load for the 4 gauge shotgun was 20 drams of powder and 6 ounces of shot.

In hunting ducks and shore birds on the bay, the flocks were "worked" with and the shooting done from the scull boat.

Three guns were carried in the scull boat, namely; the 12 gauge, 10 gauge, and 4 gauge shot guns. Generally the shooting was done with the 10 gauge, the 4 gauge being reserved for a "big shot" at a large flock of ducks, and the 12 gauge to shoot the crippled ducks.

Frequently shots were made from the scull boat that resulted in a bag of from 50 to 100 birds. My best show with the 10 gauge resulted in a bag of 38 teal, while my best shot with the 4 gauge netted me a bag of 67 mixed ducks. My partner's best shot with a discharge of one barrel of the 4 gauge was a bag of 89 mixed ducks, and a bag of 120 mixed ducks as the result of a discharge of both barrels of the 4 gauge.

"Big shots" at shore birds were generally secured by the use of the scull boat along the bay shore at high tide. The 10 gauge was used to make these shots and a mixed bag, consisting of from 75 to 100 willet, curlew, dowitcher, plover and other shore birds was not unusual as the result of the discharge of both barrels.

During the seventies, eighties and nineties, deer, quail and rabbits were shot and trapped by market hunters in all of the peninsular counties, and in the counties bordering on the San Francisco Bay as well as in other sections of the state.

It is safe to say that during these years thousands of deer and upwards of 200,000 quail and a million ducks, geese, and shore birds, were annually sold in the open markets within the state.

During the seventies and eighties, the principal market hunters in the San Joaquin and Sacramento River sections were Joe Sharp, Hermann Reed, Jim Sutten, the Lambert Brothers, "French Pete" and "Butcher Bill," and in the upper San Francisco Bay region Peter Petersen (Pete, the Hunter), George (Plug) Littlejohn, Charles (Charley Pikin) Petersen, Louis Werder, Charley Kee (Chiney Charley), Tom Redman and Thomas (Coal Oil Tommy) Wilson, were the recognized market hunters.

The first leasing of land for duck shooting purposes that I recall was about 1882 or 1883. During those years Twitchell Island, near Rio Vista, on the Sacramento River, was leased by market hunters for duck shooting purposes and, if I am not mistaken, the leasing of this island by market hunters was the beginning of the establishment of private duck shooting preserves in California, as within the next succeeding few years many private duck shooting preserves were established by various clubs on the Suisun marsh and in various other sections of the state.

During the late seventies and early eighties Hart and Goodwin and George H. Pitts and Company were the principal wholesale and retail dealers in wild game in San Francisco. Hart and Goodwin's place of business was located in the old California Market and that of George H. Pitts and Company at Clay and Sansome streets.

To these markets most of the market hunters consigned their game and paid a commission, usually 10 per cent, for its sale.

The average price received by the market hunters for their ducks during the seventies and eighties ranged from $2.50 to $3 per dozen for "cans" (canvas-backs) and mallards; $1.75 to $2 per dozen for "sprig" (pintails); $1.25 to $1.50 per dozen for small ducks, widgeon (balleys), gadwall (grey duck), shovelers (spooneys), greater and lesser scaup (blue bills), ruddy duck (wire tails and spatters), buffle-head (butter balls), golden eye (brownies and whistlers), and $1 to $1.75 for green wing and cinnamon teal.

White geese, brant, "speckled breast" and grey geese ranged from $1 to $3.50 per dozen, and Canada geese (honkers), swan and sandhill cranes from $4 to $6 per dozen. Bittern, blue and night heron, curlew,

plover, willet, godwit, dowitcher, rail, yellowlegs, sandpipers and other shorebirds from 50 cents to $1.50 per dozen. Grebe skins and seal skins brought from 75 cents to $2 each, and seal oil 75 cents per gallon.

Quail, rabbits and squirrels brought the hunters from 75 cents to $1.50 per dozen and deer meat from 10 cents to 15 cents per pound.

The market hunters sacked their game and shipped it to the markets via river steamers and railroad trains. Upon arrival in the markets, the game was sorted out and the various species placed in piles on the floor of the markets and hung in pairs and bunches on the hooks of the game stalls. Early each morning during the game season great numbers of peddlers, retail game dealers, restaurant and hotel keepers assembled at the markets and bought the game at the lowest price possible for resale. By seven o'clock in the morning the peddlers were offering game for sale by walking through the streets of the city with a back load of ducks and geese crying—"Wild game! Wild game!"

While there was something of adventure, there was not much real excitement in the life of the market duck hunter. It was all in the day's work, and of such nature as to remove all sense of sportsmanship.

Under the unwritten law that prevailed among the market hunters, the shooting began at daylight and was continued until sunset as suited the pleasure of the hunter, the object being to kill as much game and as economically as possible.

In those days, quail and deer were the only birds and animals protected by law, and then only during a short closed season.

As the duck season opened September 1st and closed March 1st, we would begin shooting ducks on the opening date and continue duck hunting until the close of the season, when we would begin hunting shore birds and grebe. This we would continue until about the middle of April, when we would begin to hunt seal for their oil and skins, which found ready sale at the tanneries at Redwood City.

While I did very little quail hunting for market, and have never made a "big shot" at quail myself, I know of instances where as many as 35 or 40 quail were retrieved as the result of the discharge of a 12 gauge shotgun.

About 1885 I gave up market hunting and entered other vocations, but it was not until about 1892 that any real decrease in the supply of waterfowl and other wild life in this state became noticeable, and not until 1900 was any real effort for the enactment of laws for the better protection and conservation of fish and game undertaken. But not until within the past two years was the general apathy that prevailed among sportsmen removed and any united constructive move made by the people and the sportsmen for the protection of fish, game and wild life.

How much better it would have been for the protection and conservation of wild life and the propagation of fish and game as an asset and resource of the state had the people endorsed the idea of wild life conservation and acted fifty years ago, instead of at this late date.

FOOD HABITS OF THE CHINESE PHEASANT.

By August Bade, Superintendent, State Game Farm.

Ever since the introduction of the Chinese pheasant in the state of Oregon in the early eighties there has been much discussion periodically

as to the food habits of the bird. Many claimed the bird was an economic asset to the farmer while others saw fit to brand him as a destroyer of crops and asked for his scalp. The writer grew up, so to speak, among the birds and had the opportunity of observing them at close range over a period of twenty-five years. In the majority of cases, when all the evidence had been gathered, the bird has been given a clean bill of health and declared a friend and not an enemy to the farmer.

One of the very interesting phases of the question to me is this; as the bird becomes well established in a community and the people come to know him intimately you scarcely ever hear this question of his depredations raised at all. He is admired by many for his alertness and beauty and by others for his helpfulness in the destruction of the

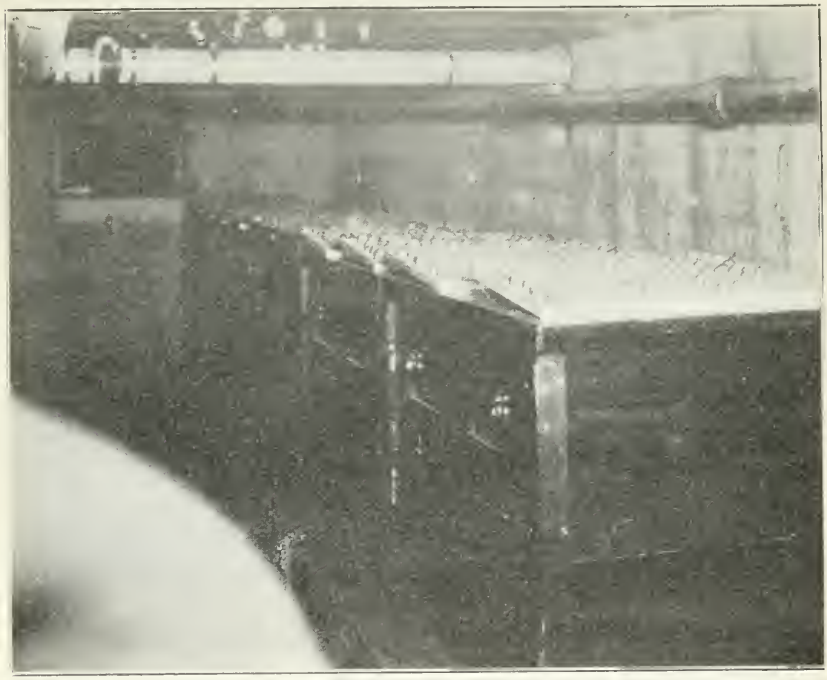


FIG. 39. Incubator run at the State Game Farm, showing 1550 ringneck pheasant eggs.

many insect pests that cost the agricultural man thousands of dollars yearly. When the question is raised, it is usually by someone who is looking for copy or the man who has been shooting out of season and is looking for justification for a guilty conscience.

With the introduction of the pheasant in Washington, some twenty years after the Oregon importation, this question kept coming up until the State Department of Game and Game Fish instituted a thorough investigation. The results of that investigation are now matters of record and may be had by anyone interested enough to ask for them.

Since the bird is purely insectivorous, it would on the face of it and in view of the established facts, seem a little far fetched to accuse him of

eating grains and other crops usually grown by the farmer. It is true that many birds are seen in grain fields and on other lands used by the farmer, but if the trouble were taken to ascertain the facts it would be found in nearly every case that he was there because of the presence of insects where it was far easier for him to get the food that he naturally lives upon.

There is one and only one sure way to get at the facts of the food of any bird or animal, and that is to examine the crops or stomachs of a sufficient number to get a fair average. When this is done the stigma of destruction laid at the door of the pheasant disappears as quickly as the morning fog before the rays of the sun. In one particular case I saw the crop contents of a hen pheasant that had been shot in the center of a thousand acre wheat field that contained not a single kernel of grain

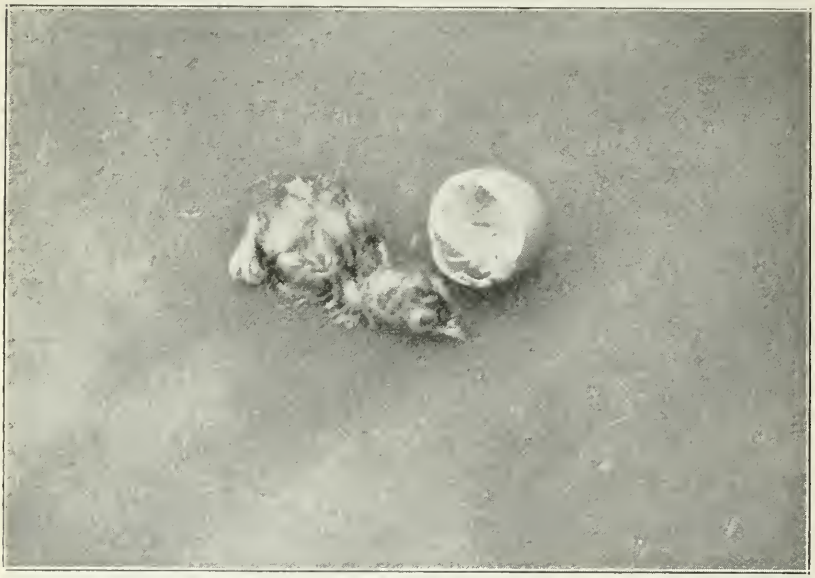


FIG. 40. "Out of prison." This baby pheasant has just freed himself of the shell. Photograph by H. C. Bryant, State Game Farm, May 6, 1927.

but was made up of worms, bugs, mustard seed, and quite a per cent of greens.

It is true that cereals of different kinds are used by many game bird breeders as food but if the grains are not first cooked, the results are sometimes very discouraging. Usually they are used as a substitute food and if insect food or its equivalent is not given as a part of the daily ration of the bird and the results obtained will not justify the trouble and expense incurred. One of the biggest problems of game bird farming has been to find suitable insect food or its equivalent.

During the season of 1923 an incident came to the attention of the writer that will give you some idea of the value of the pheasant to the farmer and the esteem in which he is held. It was at the time when the first birds were being distributed from the game farm at Walla Walla, Washington, and the requests were coming in from all sections

of the country. J. M. Blue, a farmer of the Walla Walla Valley, asked for an allotment of birds for his locality and promised absolute protection even during the open season. His request was granted and the birds were delivered from the farm by truck, a distance of fifteen miles. At his suggestion they were liberated in an alfalfa field near his residence. In a few weeks he phoned to know if he might have more birds. He was informed that there were no more birds available for his section. In a little while the request was repeated. He was again refused. It was at this time that he advised me that he had secured an extra cutting of alfalfa hay because of the presence of the few birds planted on his place. Wire worms had just about taken the neighborhood and many of his fellow farmers had but one crop while he had secured an extra one and was perfectly willing to give credit to the birds. He told me afterwards that no hunting would be allowed on his place at any time.

Another very fine tribute to the pheasant came to the writer unsolicited from Carl Miller of Twin Falls, Idaho. Mr. Miller had moved from the Walla Walla Valley to the Twin Falls section at the time of the opening up of a large irrigation project. He secured some land and evidently prospered, for in a few years he persuaded three or four of his neighbors to go in with him and buy some pheasants for stocking their lands, with the idea of having private sport after a reasonable closed season. The lands of the four or five farmers were posted and the birds planted. They multiplied rapidly under the climatic conditions and the protection given them and it was just about time to declare the long looked for open season. That part of Idaho was hit by a terrific scourge of grasshoppers for no good reason at all and many of the farmers lost heavily and in some cases the destruction was complete. The farmers who had planted the pheasants lost nothing. Mr. Miller gave the birds full credit for saving them thousands of dollars. And they could still have the open season for which they had waited.

Another little incident of a personal nature will not do any harm. John D. Ankeny, son of the late Senator, Levi Ankeny, Walla Walla, Washington, related this incident as his personal observation on one of his farms near the city.*

The foreman of this particular farm complained that he could not raise any corn because the pheasants dug it up as fast as he would plant it. Mr. Ankeny was of that turn of mind that he usually investigated a matter before rendering judgment. For several mornings before taking up his duties at the bank he would drive out to the ranch and spend an hour or so watching the pheasants dig up the young shoots of corn. They were doing that very thing. The complaint of his foreman was justified, apparently. However, he went into the matter a little further and discovered that cut worms were destroying the shoots of corn and the pheasants were after the worms. He concluded that the pheasant knew by the wilting of the corn that a worm was near at hand and he went after him and the digging up of the corn was only incidental to the operation.

*Mr. Blue is a farmer of the Walla Walla Valley, Mr. Miller is a farmer-legislator in Idaho and Mr. Ankeny is president of the First National Bank of Walla Walla and associated with several other banks of the valley and state. They are all representative citizens of their localities. These facts can be easily verified.

RECENT LEGISLATION.

Of the 121 bills relating to fish and game introduced in the 1927 session of the state legislature forty received favorable action. Harmony seemed to prevail and there was little opposition to the major matters. Members of legislative committees gave ear to both sides of each question and on the whole seemed to make fair judgments. For this reason the Governor was willing to sign practically all of the bills passed. As a result a number of constructive laws were enacted.

Three new laws will greatly help in wisely administering the state's wild life resources. First and foremost in Senate Bill No. 610, which amended the hunting and angling license act to provide for an increase to $2 each for both resident hunting and angling licenses. The law also provides that one-third of all moneys received for hunting licenses must be held in a special fund to be used for the purchase of game refuges and public shooting grounds. This gives hope of improving the duck hunting in the state.

A second law of importance is that which gives the Fish and Game Commission, through the Director of Natural Resources and the Governor, authority to close to angling streams and lakes or portions of streams and lakes that have been stocked with trout. In the past anglers have often cleaned newly planted streams of small fish. Certainly when a stream is planted fish should have a chance to reproduce themselves before being caught. This new law will allow California to follow Oregon's example in closing streams in order that fish may be allowed to grow to the proper size.

The third important measure provides for a special deer tag license costing $1. Each legally killed deer will hereafter have to bear a tag license. When this has been properly signed by an official authorized to administer an oath, or by a regular deputy of the Fish and Game Commission, the carcass of the legally taken deer may be shipped from an open district into a closed district. Sportsmen have desired such a provision for many years. It will allow a hunter without too much red tape to bring back his buck and use it for food even though killed at a distance from his home town. Furthermore, it will give the Fish and Game Commission a check on the actual number of deer killed each year and will prevent grasping sportsmen from securing more than their allotted number of bucks per season.

A total of about forty measures was actually passed and signed by the Governor. Several of these were slight amendations of the game laws. At least two provided for new refuges. One was necessary to make the open season on ducks and geese conform with that of the federal law. The opening of the trapping season has been changed from October 15 to November 15, thus shortening the season one month. Three fur-bearing mammals, the kit fox, beaver and muskrat, have been added to the list of fur-bearing mammals. According to another bill commercial hunting clubs will be licensed in order to prevent certain abuses. This will not in any way affect the privately owned and operated clubs.

Modification of the laws relating to fish include the prohibition of the use of a spear in taking trout (it is still allowed in the taking of salmon in certain districts). Increase in the size limit of pismo clams to five inches and a limit of thirty per day placed upon razor clams.

The summary of the changes made follows:

SUMMARY OF CHANGES IN FISH AND GAME LAWS.

Legislative Session, 1927.

Senate Bill No. 106—Amends section 627*b* Penal Code.

Amends the law relative to the shipment of fish by parcel post by allowing the shipment of salt, dried or cured fish other than *trout* by parcel post.

Senate Bill No. 128.

Creates a new game refuge in San Jacinto Mountains, Riverside County.

Senate Bill No. 356—Deer Tag License Act.

Provides that everyone who hunts deer must do so under authority of a deer tag license, costing $1 for two tags. It provides that the tag license must be tied to the horns of the deer immediately upon killing and the duplicate filled out and mailed immediately to the Fish and Game Commission. It further provides that a deer legally killed in an open district may be transported into a closed district by having the tag license countersigned by an official authorized to administer an oath, or by a regular deputy of the Fish and Game Commission.

Senate Bill No. 462.

This bill provides that live domestically reared trout may be transported from one private hatchery to another under a permit from the Fish and Game Commission, and places restrictions on the placing of domestically reared trout in any of the streams of the state.

Senate Bill No. 463—Amends section 626*g* Penal Code.

This bill continues the present closed season on tree squirrels.

Senate Bill No. 465—Amends section 626*k* Penal Code.

This bill prohibits the importation for food purposes of certain species of birds, and adds "partridge-like" birds to the present list of species that are not allowed to be brought in. This is necessary in order to protect our present species.

Senate Bill No. 466.

This bill provides for a five per cent commission on the sale of hunting, angling and other licenses.

Senate Bill No. 535—Amends section 628 Penal Code.

This eliminates the importation of crabs during the closed season for the taking of crabs in this state. It allows the importation and sale of crab meat under regulations.

Senate Bill No. 583—New section 626½ Penal Code.

Removes water fowl, including ducks, geese, mudhens and jacksnipe, from section 626 and provides for an open season from the first of October until the fifteenth of January. This season conforms to the federal law.

Senate Bill No. 605—Amends section 642 Political Code.

Gives the Commissioner the right to employ nonsalaried deputies. Provides for a bond of $2,500 on such deputies, the premium to be paid out of the fish and game preservation fund. This legalizes the deputizing of Forest Service officers.

Provides that the Commission may carry on scientific investigation for the proper understanding of the conservation laws.

Provides that the Commission may purchase lands for refuge and public shooting grounds.

Senate Bill No. 606.

Authorizes the Commission to take such steps as are necessary to reduce any species of wild life that may unduly prey on another species.

Senate Bill No. 607.

Gives the Commission, through the Director of the Department of Natural Resources, and the Governor, authority to close to angling streams and lakes or portions of streams and lakes that have been stocked with trout.

Gives the Director of the Department of Natural Resources, and the Governor, authority to close areas to campers during emergency.

Senate Bill No. 610—Hunting and Angling License Act.

This increases the hunting license fee from $1 to $2. Provides that those residents under the age of 18 years can secure a license for hunting for $1. The fee charged declarant aliens, aliens and nonresidents is not changed.

The angling license is increased from $1 to $2. No license required of those under 18. Nonresident licenses the same as at present, $3. Alien license is increased to $5.

The hunting license year is changed from the fiscal year to the calendar year, but it provides that the law will not go into effect until January 1, 1928, and that the hunting license issued for the fiscal year July 1, 1927-July 1, 1928, shall be valid until July 1, 1928.

It adds to the list of game fish perch, crappie, calico bass and sunfish.

Provides that one-third of all moneys received from hunting licenses must be held in a special fund, to be used for the purchase of game refuges and public shooting grounds. The areas to be purchased to be passed upon by the advisory committee of seven members who are appointed with the approval of the Governor.

Senate Bill No. 635.

This removes from the commercial fish area certain waters in the vicinity of Stockton and allows striped bass to be taken there by anglers only.

Senate Bill No. 860.

This adds to game refuge 4-B certain lands that are owned by the city of Los Angeles.

Senate Bill No. 725.

This provides for the licensing of commercial hunting clubs, but will not affect in any way privately owned and operated clubs. The intent of this law is to prevent the abuses which are said to have been in practice on some commercial clubs.

Assembly Bill No. 27—Amends section 634 Penal Code.

Provides that salmon may be taken with a spear, or hook and line, in districts 1, 1½, 2, 2½, 3, and in the Klamath River *except* tidewater.

Provides that two salmon per day may be taken in districts 8, 9, 12A, 1, 1½, 2, 2½, 3, and during the closed season for nets in districts 12, 12B, 13, and Klamath River tidewater.

Provides a closed season for the taking of salmon as follows:

District 1, November 1 to May 31;

Districts 1½, 2, 2½, 3, and the Klamath River, October 6 to May 31;

Districts 10 and 11, August 16 to April 30;

Districts 15, 16, 17 and 18, August 16 to March 31.

Assembly Bill No. 199—Amends section 637*c* Penal Code.

Provides for the protection of California sea lions only in districts 19, 20 and 20A; removes protection from them in all other sections.

Assembly Bill No. 244—New section 626*da* Penal Code.

This removes all protection from cottontail and brush rabbits in district 4¾.

Assembly Bill No. 448.

Provides an amendment to the law governing the installation of fish screens.

If a screen has once been installed in accordance with the plans and specifications of the Commission, and thereafter it is necessary to install a screen of new design, then such second installation must be paid for by the Fish and Game Commission, but cost of maintenance must be borne by the owner of the land on which such screen is installed.

Assembly Bill No. 601—New section 628*k* Penal Code.

Provides for a closed season on grunion during the months of April, May and June.

Assembly Bill No. 649.

Gives protection to pheasants all over the state, by closing the one open section now existing in District 4¾ in southern California.

Assembly Bill No. 650—Amends section 632 Penal Code.

Provides that *trout* may only be taken by rod and line, the rod to be held in the hand. Spearing is absolutely prohibited.

Provides open season on all trout except *golden trout* as follows:

All districts *except* 2½, 4½, 23, 24, 25, May 1 to October 31.

District 2½, May 30 to February 14.

Districts 4½, 23, 24 and 25, May 30 to October 31.

In tidewater and in districts 2, 3 and 15, and in Napa and Russian rivers, May 1 to February 28.

In addition to the summer open season, in districts 1½ and Klamath River, provides for a winter season during November and December.

In Lake Almanor the season will be May 1 to October 31.

In the Truckee River the season will be from May 15 to October 31.

The limit will be the same as at present throughout the state, with the exception that in tidewater in districts 2, 3, 15, and in the Russian and Napa rivers from November 1 to the last of February, the limit is three fish per day regardless of size.

The open season on *golden trout* is the same as at present, July, August and September.

Not more than two attractor blades and three hooks on any line.

District 1¾ includes Modoc and Lassen counties.

District 1½ includes Siskiyou, Humboldt and Del Norte counties.

District 1 includes the Sierras from Siskiyou County down to Kern County.

Districts 2 and 3 include the coast counties.

District 4½ includes Inyo and Mono counties.

District 4¾ includes San Diego and Imperial counties.

District 4 includes the other counties south of the Tehachapi mountains.

Assembly Bill No. 653—Amends section 626*i* Penal Code.

This provides for a one-deer bag limit in district 1¾, Modoc and Lassen counties, but provides that a resident of that district may kill an additional deer in another district and transport it to his residence when he has complied with the other provisions of the law. The bag limit in all other parts of the state is left as at present.

Assembly Bill No. 660—Amends section 628*f* Penal Code.

The size limit for Pismo clams is increased from 4¾ to 5 inches. A limit of thirty per day is placed on razor clams and it is made unlawful to ship or offer for shipment any Pismo clams.

Assembly Bill No. 803.

This bill changes slightly the boundaries of some of the game refuges and adds a new refuge.

It adds new districts 1N, 1O, 1P, 1Q, 3G. These districts are set aside by Assembly Bill No. 805 as game refuges.

It changes the boundaries of district 12, a commercial fishing district of the Bay region. Prohibits the commercial fishing of striped bass in that portion of San Francisco Bay lying west of a line drawn from California Point to San Quentin Point, and from San Quentin Point to San Pedro Point; that portion of San Pablo Bay lying west of a line drawn from San Pedro Point to the south bank of Novato Creek, and that portion of San Pablo Bay lying north of a line drawn from the south bank of Novato Creek due easterly to Mare Island.

It removes all of Gualala River from district 2½.

Assembly Bill No. 807—Amends Fur Trapping Regulations.

Postpones the opening of the trapping season from October 15 to November 15, thus shortening the trapping season one month.

Adds kit fox, beaver and muskrat to the list of fur-bearing mammals.

Removes protection from bears in districts 1, 1½, 2 and 2½ until July 1, 1930.

Assembly Bill No. 867—Amends section 628*b* Penal Code.

Reduces general bag limit on black bass from 25 to 15 per day; increases minimum size limit from seven to nine inches.

Assembly Bill No. 998—Amends section 626*f* Penal Code.

This bill provides that in the Sierra region in districts 1, 1¾, 4, 4½, 4¾, 23, 24, 25 and 26, the open season for the taking of deer shall be from the 16th of September until the 15th of October. The season is thus shortened two weeks owing to fire hazard. The deer season of the other parts of the state is not changed.

Assembly Bill No. 1201—Amends section 626*o* Penal Code.

Prohibits the hunting of ducks from scull boats in district 12, San Pablo Bay, and in that part of Napa River south of Edgerly Island

CALIFORNIA FISH AND GAME.

A publication devoted to the conservation of wild life and published quarterly by the California State Fish and Game Commission.

Sent free to citizens of the State of California. Offered in exchange for ornithological, mammalogical and similar peridocials.

The articles published in CALIFORNIA FISH AND GAME are not copyrighted and may be reproduced in other periodicals, provided due credit is given the California Fish and Game Commission. Editors of newspapers and periodicals are invited to make use of pertinent material.

All material for publication should be sent to **H. C. Bryant, Postal Telegraph Building, San Francisco.**

August 18, 1927.

Fishing and hunting constitutes the best of antidotes for the nerve wear of civilization.

INCREASED LICENSE FEES PROVIDE FOR ENLARGED PROGRAM.

We record with pleasure the fact that the legislature has adopted, and the Governor has signed, the bill increasing our angling and hunting licenses to $2 each per annum. This measure finally puts California on a par with many of its sister states and allows us to enter upon an enlarged program to restore fishing and hunting in our state.

The law does not go into effect until January 1, 1928, but during the fiscal year commencing July 1, 1927, we will have a portion of the increased revenue which accrues during next spring; consequently we can immediately start our program in a limited way.

The Commission has laid out an extensive four-year program, providing for new permanent equipment on hatcheries, game farm, refuges and public shooting grounds. In fact, the new bill provides that one-third of all hunting revenue for a period of five years must be used in the purchase of game refuges and public shooting grounds.

During this first year the Commission contemplates the construction of four new hatcheries, a new game farm in southern California, the employment of thirty new full-time deputies, enlargement of our educational work by the employment of additional lecturers and assistants, a more extensive research into all fish and game problems and a program which calls for the actual planting of all fish by our own trained employees.

The entire program as outlined will continue to stress the aim of the Commission since its reorganization, which is to place conservation in California upon a strictly business basis.

EAR MARKS OF PROGRESS.

Everyone interested in fish and game has noted the splendid results attending the reorganization of the Fish and Game Commission instituted two years ago. The corps of law enforcement officers now working directly under one head and supervised by captains comprise now a unified and efficient body. A neat uniform worn on proper occasion has given the men a certain pride in themselves and has helped to gain the confidence of the public. There is continual endeavor to increase efficiency everywhere. Recently additions have been made to the notebook carried by each game warden: a map showing the location and the number of birds concerned in the sixteen pheasant plants made from the game farm last year; another map locates all of the eighteen hatcheries and twenty egg-collecting stations operated by the fish cultural department; a third map indicates the number of mountain lions killed in each county of the state in 1925, together with the total number killed in each county since the bounty on lions was first offered in 1907.

COMMISSION GIVEN POWER TO CLOSE STREAMS TO FISHING.

The Fish and Game Commission plants millions of fish in lakes and streams each fall. A few months later the trout season opens and anglers catch the same fish grown only an inch or two longer, and before they have grown old enough to propagate themselves. The legislature has made all regulations concerning protection and it meets but once every two years. For some time it has been apparent that the one satisfactory way of handling this situation was to have the legislature grant plenary powers to the Fish and Game Commission.

A new act (Senate Bill No. 607) entitled "An act to authorize and empower the Director of Natural Resources to close to fishing and camping any area in any state park or forestry area or fish and game district" is now a law. It reads as follows:

SECTION 1. For the purpose of further protecting trout with which the fish and game commission has stocked the various waters of this state, the director of natural resources, with the consent of the governor, is hereby authorized and empowered, upon recommendation of the fish and game commission, to close to trout fishing any stream or lake of this state, or designated portion thereof, for such time as such director may designate, or until such time as new legislation thereon enacted by the state legislature may become effective.

SEC. 2. The director of natural resources, with the consent of the governor, shall have power to declare closed to camping any area in any state park or forestry area when, in the judgment of the director, such declaration is necessary in the interest of public peace or safety, and the director of natural resources shall have power and is vested with the duty of enforcing such order against camping.

SEC. 3. During the period when any open season is suspended or closed by the director of natural resources, all provisions of law relating to the

closed season for such fishes shall be enforced; and each person who violates such provisions shall be subject to the penalties prescribed therefor.

SEC. 4. Any order issued under this act shall be published twice in at least one newspaper of general circulation in any county affected by such order and such publication shall be separated by a period of not less than one week and not more than two weeks and such order shall be posted in such public places in each county as the director of natural resources may direct.

deavor and, second, in knowledge. It really appears that sentiment is favoring more activity looking to the preservation of wild life resources, but how can this activity be guided in the correct projects without proper knowledge. Of first importance is the gathering together of knowledge secured by others of the life history and habits of game

FIG. 41. With evidence present in court that he had been trapping quail, Tokukino was arrested by Deputies Post and Newsome near Salinas. He was fined $125 and given six months suspended jail sentence, March 10, 1927, for killing quail in closed season and hunting without a license.

Although discretionary powers are very limited, a means of improving fishing, such as Oregon has had, is now available. This new law should greatly help in improving angling conditions.

EXPERIENCE BEST TEACHER.

The solution of the many problems relating to game conservation lies first, in and then taking it one step farther and securing all that the present day can furnish. In this accumulation of scientific data lies the foundation of worthwhile conservation projects. Too little scientific research is being undertaken to properly assure worthwhile results in conservation undertakings.

HAVE YOU A DEER TAG LICENSE?

Under the provisions of the new law which is now effective, it is necessary for every person who hunts deer to have a Duplicate Deer Tag License in addition to the regular hunting license. The cost of the Deer Tag License is $1.00 for two tags, in duplicate, which may be obtained from the Fish and Game Commission, any County Clerk or license agent.

The Deer Tag Licenses are duplicate in form, and must be carried by the licensee at all times while hunting deer. When a deer is killed, a tag must be filled out and the original attached to the horns of the deer and the duplicate mailed immediately to the Fish and Game Commission.

A further provision of the new law is that a deer, lawfully killed in an open district, may be transported into a closed district by having the tag license countersigned by an officer authorized to administer oaths, or by a regular deputy of the Fish and Game Commission.

If fully complied with, this measure makes it possible to secure an accurate tabulation of deer killed in the state. This information is essential as a basis for conservation legislation. Without laying stress on the fact that failure to do so is a misdemeanor, every deer hunter is asked to furnish all of the information required concerning deer killed by him.

THE NEW DEPARTMENT OF NATURAL RESOURCES.

Every big business operates under a system of departments and subdepartments, with elimination, as far as possible, of all duplication of effort. The State of California spends more money and has more work to do than the average corporation, yet heretofore there has been much duplication of effort and altogether too many separate and distinct departments for the business of government to function efficiently. A few years ago an experiment was tried on combining a number of state commissions under one head, the director of agriculture. Everyone agrees that this was a good move and that these various duties of the state have been more effectively carried out. The present state administration has rightly planned further coordination of departments which will result in the creation of a governor's cabinet made up of the directors of various main departments. Several commissions having to do with natural resources and their conservation have been coordinated and henceforth will function as divisions of a Department of Natural Resources. This department, under the direction of an appointee of the Governor who will sit in the Governor's cabinet, will include the Fish and Game Commission, the Department of Forestry, the State Mining Bureau, Department of Petroleum and Gas, and the Department of State Parks, which has just been established.

No actual change in the organization or functioning of the Fish and Game Commission is contemplated. A commission of three men will continue to administer conservation activities and this Commission will continue to be a self-supporting body and all fish and game funds will be utilized in fish and game conservation.

The benefits accruing from this reorganization are two in number.

1. Direct approach to the Governor and other departments of the state through the director of the Department of Natural Resources.
2. The harmonizing and coordinating of the work of the various conservation departments of the state.

DESERTED FAWNS.

The breeding grounds of deer, in spite of the fact that they are often included within the game refuges, do not furnish complete protection. Nowadays, the fawning grounds are overrun with summer vacationists, nor do all of these summer vacationists respect the rights of game. All too often a fawn is stolen from its mother. The time-honored explanation is that "the poor little thing was found starved and deserted by its mother." Those who know the habits of deer, know that such an explanation is not a satisfactory one. The real explanation shows inhumane treatment. Deer do not desert their fawns and those that are carried home to be fed on a bottle are really stolen from the mother that is watching from behind a near-by tree. The average person finds the job of feeding a baby deer too exacting with the result that most die. If the fawn is reared to maturity, application is soon made to the Fish and Game Commission for its removal because of the danger and difficulty of handling a mature deer. It has long been the policy of the Fish and Game Commission to look with disfavor upon the many who write in for permits to hold a "poor, little, starved fawn found deserted by its mother."

DO YOU KNOW YOUR GAME WARDEN?

As was explained in a previous number of California Fish and Game the patrol has been reorganized and captains have been placed in charged of the men in various districts. The list of deputies appears on the back cover of this number. By reference to it, anyone can cooperate with the Com-

mission by reporting to the deputy of the district in which he may be hunting or fishing any flagrant violation of the fish and game laws. These men are listed with this end in view. The deputy is there to help conserve game. One would not hesitate to report a burglar, and people should feel the same about reporting fish and game law violations. The warden needs your cooperation.

FISH DISTRIBUTION.

By June 1st plans were practically complete for the start of the 1927 planting of trout under the new program adopted for this year's work by the Fish and Game Commission.

Patrol Captain Oliver P. Brownlow, having been placed in charge of the fish planting program, completed a survey of the conditions throughout the state and began supervising the distribution of young trout as soon as they were ready to leave the hatchery.

Patrol captains throughout the state were interviewed and data from various sources collected. Deputies have made comprehensive reports on the need for fish in various sections this year. In practically all districts it has been found that sportsmen and the various organizations that have been planting fish in years past are enthusiastic regarding the new plan that provides for the supervision of the plant by patrol captains and their deputies.

Under the new plan the applications for fish are made by the captains of patrol and the fry is consigned to the captain or deputy in sections where there is no captain. As a result, the authorized officers of the Fish and Game Commission take active charge of the planting and responsibility can be fixed for the placing of the fish in the proper places.

Much barren water will be planted this year, in addition to the stocking of trout streams and waters that have already been established as good fishing grounds and care will be taken that none are wasted in streams that dry up. The hatchery output is to go into those streams and lakes where they are needed and not to individuals who wish to stock their favorite fishing grounds.

Before this new system can be made to function properly a biological survey of lakes and streams is badly needed. Several eastern states have undertaken such surveys and California should not delay similar work. Plans in this direction are being formulated.

NATURAL HISTORY INSTRUCTION IN THE SCHOOLS.

For many years a state law provided that nature study should be taught in every public school. In spite of the law there were few places where the subject was adequately handled. When school superintendents were put the question, "why are you not doing more with nature study?" two answers were forthcoming: first, "the curriculum is already so full that we have had to eliminate some subjects;" second, "we are unprepared to teach nature study and we have not had sufficient time to secure the necessary training." As a result of the first complaint, the 1925 legislature revised the school law and eliminated therefrom the requirement that nature study be taught. There are now twelve subjects prescribed by law with three electives. These prescribed subjects do not include nature study nor elementary science, although humane education is included. In those counties where the Board of Education is sufficiently interested in nature study, it is designated as one of the electives.

It may be that this subject will really gain by not being required, for sometimes the things that are forced are least effective. Certainly if the matter is handled wisely, we can still expect to accomplish much in the public schools. At present plans are being laid for the furnishing of such attractive material that teachers will want to make use of it. In this lies perhaps the best solution to the problem of teaching conservation in the public schools.

THE DUCK FUND.

The attempt to raise a certain quota to finance a survey of Lower Klamath Lake in order to determine how the problem of restoration of this one-time game refuge can be solved has been successful in California. The Associated Sportsmen placed subscription lists in various sporting goods stores and collected a portion of the sum and the owners of duck clubs made up the remainder. This has been sent to the chief of the Biological Survey for use in determining the cost and the best means to be taken to restore the famous breeding ground for wildfowl. After this survey has been made, it will be possible to determine the next move.

PLANS FOR INCREASING THE DUCK SUPPLY.

Three years of poor duck shooting in California has started sportsmen to seek a way of replenishing the supply of ducks. That similar conditions have existed elsewhere was indicated by recommendations by the Advisory Board, Migratory Bird Treaty Act, at their meeting held December 9, 1926. A resolution was passed proposing a reduction of the daily bag limit on ducks from twenty-five to fifteen in all states or parts of states, and a reduction from eight to six on the daily bag limit of geese to be effective throughout the country.

This proceeding resulted in such a large number of protests being sent to the Secretary of Agriculture, that a public hearing was ordered held at Washington on January 20, 1927. About ninety people were in

attendance. The discussion brought out that reduction in bag limit is an exceedingly ineffective and unsatisfactory method in actually reducing the kill of birds due to the fact that it is practically an impossibility actually to control the number of birds each hunter kills in view of the very limited number of available wardens. Discussion then centered upon the shortening of the open season as a means of reducing the annual kill. This proposal of a shortened season met with an equally vigorous protest.

Because of pending legislation it was important that the controversy should be promptly settled. After an exchange of telegrams relative to a proposed change in the season of ducks in the area east of the Sierra Nevada, where it was shown that the boundaries of a proposed district were unsatisfactory, the matter ended by the passage of a bill in the legislature setting the opening of the season again on October 1st and its close on January 15th. This return to an earlier opening date appears to be the most satisfactory solution.

Sportsmen everywhere are trying to improve the situation. In many states, laws providing for the reduction in the bag limit are pending and in a number of states, a definite plan has been worked out for the creation of numerous wildfowl refuges.

The increase license bill, proposed at the last legislature, carried a provision that a share of the increased income should be immediately put into the purchase or rental of suitable wildfowl refuges. The best informed conservationists stand behind the proposition that it is far better to furnish attractive feeding places for wildfowl than to reduce the kill.

It is quite apparent here in California that the continual draining of marshes has left little suitable feeding grounds for ducks and that most of them upon their arrival in the fall travel southward to Mexico where they find conditions more natural. Some of these ducks might well be enticed to stay in California and thus augment the supply, nor need there be fear that such a proceeding would necessarily reduce the breeding stock.

Fig. 42. Bird banding operations at Lake Merritt, winter 1926. The numerous ducks which had been banded during operation at California's first game refuge have resulted in a number of interesting returns the past winter. Photograph by W. W. Richards.

It will take a number of years to satisfactorily handle the problem presented. Increased precipitation in the past winter will furnish additional breeding grounds in many parts of the states and the crop of local ducks will certainly be much larger next year. Then if man helps this situation and furnishes still more available feeding grounds, a betterment of conditions can certainly be prophesied.

QUAIL RECEIVE ADDED PROTECTION.

Owing to the fact the pheasants from the game farm are only furnished to those localities that post an area and give the planted birds careful protection, a splendid series of local game refuges are thus being established. As a consequence, better protection is afforded native game as well as introduced game. Several reports are to the effect that quail have increased in these posted areas. This is exactly what should be expected when signs warn the poacher and near-by residents enforce the special regulations.

GAME FARM A BUSY PLACE.

To hear that pheasant eggs were secured nineteen days ahead of last year and that the first settings were made two weeks ahead of last season will be of interest to California sportsmen who have been watching the development of California's new game bird farm at Yountville in the Napa Valley. The first young birds hatched this year on April 12. Last season this farm, just established at that time, produced nearly 3000 pheasants for liberation. This season Superintendent Bade believes he will be able to produce 12,000 birds.

Investigation of last year's plantings has shown that birds have ranged as far as eight miles from the point of liberation. All plants are reported in good condition. Every neighborhood which received birds last season is asking for more this year.

Earlier in the spring most of the planting and cultivation of pens was completed, and a fine growth of plants was ready to furnish cover and feed for the birds when hatched.

The small breeding pens used last year for the pheasants have been transformed for use in the raising of California valley and mountain quail. Last year's experiments with these quail were a success and with another successful season there will be a supply of quail for liberation from the farm this fall.

GAME CENSUSES.

On the back of every angler's license this year is printed a blank form, together with the following statement: "The holder of this license is requested to report to the Fish and Game Commission at San Francisco, on the form below, their yearly catch of fish to be used for statistical records."

This constitutes the third real effort of the Fish and Game Commission to secure suitable statistics as to the actual take of fish and game in the state. For several years the annual kill of deer was compiled from records furnished by deputies and by the forest service. The Commercial Fisheries for several years has been gathering accurate statistics relative to the catch of edible fish. The work of this department constitutes the finest system of collecting statistics yet devised. With the appearance of the blank on the back of the angler's license we see another effort being made to gauge the take in order to determine what breeding stock is necessary to furnish a dependable annual crop.

The fourth effort along the same line is evidenced in the deer license law recently enacted by the state legislature. Under a tag system it will be possible to determine the exact number of deer killed each year.

The next step after securing statistics relative to the crop will be the securing of actual knowledge relative to the normal death rate and normal fluctuations. With proper knowledge of this sort at hand, the administration of fish and game can be placed upon a real scientific basis, with the possibility of foretelling the crop from year to year as is so splendidly done by agricultural interests with our crops.

With knowledge as to the actual need of statistics of this kind, the angler and hunter should need no urging to make statistics as complete and dependable as is humanly possible.

WILD QUESTIONS.

(Questions on the Wild.)

1. I have two mountain lions in captivity. Can I kill them and collect the bounty?

2. May I have a permit to trap some quail to keep in my aviary?

3. Is it necessary for one to have a separate fishing license if one fishes from a motor boat?

4. What fish is of most value commercially in California.

5. What native California game bird is known locally as the "native pheasant"?

6. Do I need an angling license to catch catfish?

7. Are trout migratory?

8. Does a trout die if removed from the hook and returned to the stream?

9. May I fence off a stream and use it as a private fishing ground?

10. What famous game bird of California has never been taken on the western slope of the Sierra?

11. What is the scientific name of the cinnamon bear?

(See answers on page 202.)

PHEASANT PLANTINGS.

All those interested in propagation and planting of pheasants in California can feel assured that the new game farm at Yountville is making a splendid record. With but a small breeding stock and a very late start, the output for the first year amounted to nearly 3500 birds. This has furnished a splendid breeding stock of young birds for

use this year and at the same time furnished thousands of pheasants for planting in suitable localities. Distribution has been made entirely on the basis of location. Each location has been gone over by an expert and in each instance the surrounding area has been posted and set aside as a refuge. The following map shows clearly where plants have been made and the amounts of each planting.

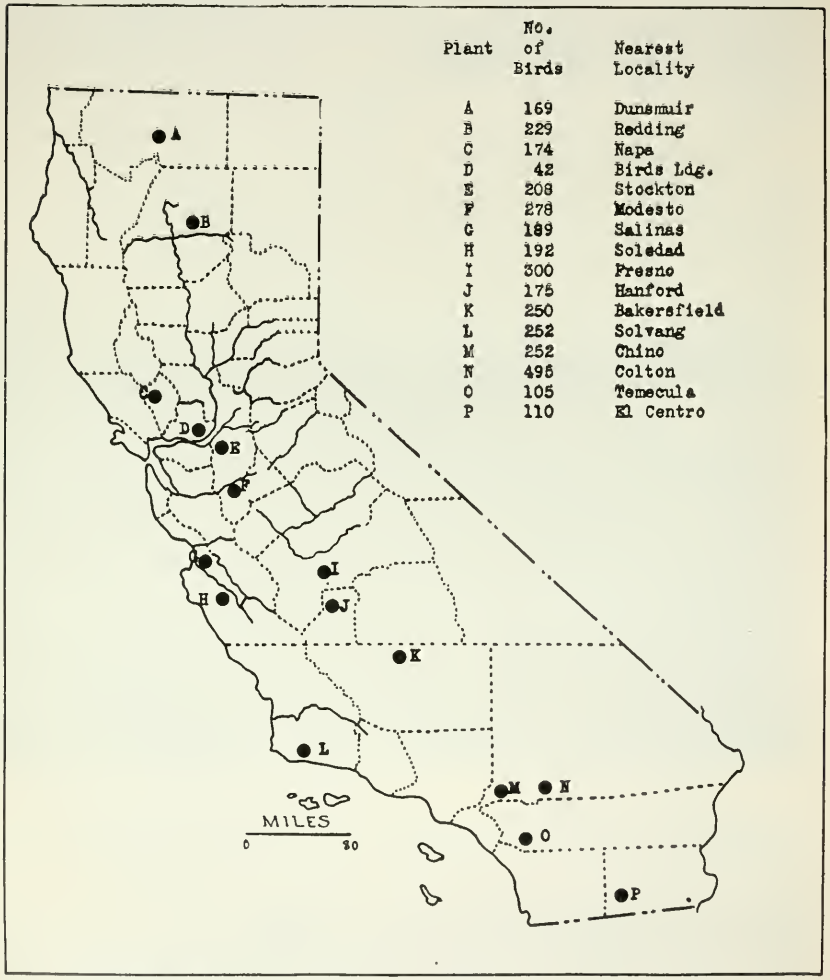


FIG. 43. Map showing Pheasant Plantings in California, 1926–27.

It will be the policy to stock these same places next year rather than attempt new plantings.

Reports show that the plants indicated on the map above have been successful. Those planted on some 3300 acres near Salinas began nesting the last of March. By April 15, two hens were seen with young, one having five, the other eleven. In some instances birds have moved five or six miles from their point of hibernation.

Near Redding, where pheasants were planted on August 11, 1926, a number of nests were found during April. At least four hens nested in an alfalfa field. There is much danger of disturbing the nests of pheasants in alfalfa fields, so farmers have been warned and all promised to be the guardians of these birds rather than destroyers of them.

SPORT FOR THE ANGLER IN SAN FRANCISCO BAY.

Although piers jutting into San Francisco Bay may not be so conspicuously lined with fishermen as those off the coast of southern

California, yet there are many who find splendid sport in catching the numerous varieties of fish which inhabit the bay. W. I. Follett, an enthusiastic fisherman, has been interested in identifying the various species available in the bay. A hastily computed list shows more than thirty varieties and if the several species of surf fish and rock fish are added, together with some species considered less desirable, the number probably mounts to fifty.

Mr. Follett has promised to furnish readers of California Fish and Game with an illustrated article dealing with various fishes which furnish sport to the San Francisco Bay fishermen.

DEPREDATIONS OF BIRDS IN FRUIT ORCHARDS.

Although a certain amount of control is practised by orchardists in the San Joaquin Valley each year, a critical situation appeared this past spring which is worthy of attention.

The following resolution passed by the Exeter Chamber of Commerce first stirred bird lovers to action:

Whereas, Reports show that certain birds are causing much damage to apricot, almond, plum and peach growers throughout the valley by destroying the fruit buds and by destroying the fruit of these trees, and of grapes, figs, truck crops, vegetable and flower gardens and destroying our best song birds; be it

Resolved, That we, The Exeter Chamber of Commerce, do hereby urge the cooperation of other clubs, schools, boy scouts, farm bureaus, women's clubs and all organizations and individuals to destroy the following birds, which are declared to be depredators, their eggs and nests: Linnet, or House Finch, English, White Crested and Golden Crested Sparrows and Waxwing, and to protect the Owls, slow moving Hawks, Jay and Butcher Birds, which destroy these depredators; and the following birds which do no injury but appeal to the esthetic sense through their songs and beautiful plumage: Blue Bird, Humming Bird, Phoebe, Chickadee, Wren, Oriole and all Warblers. Therefore, be it further

Resolved, That a copy of this resolution be sent to all chambers of commerce, farm bureaus, schools, boy scout organizations, women's clubs and newspapers of Tulare County.

THE EXETER CHAMBER OF COMMERCE
(Signed) O. W. Carr, President.
(Signed) Virginia Van Osdoll, Secretary.

Unfortunately, by the time this resolution reached the newspapers, one word had been left out making it appear that many protected birds were to be warred against by orchardists in Tulare County.

Even after all danger of destruction of fruit buds by the birds was past a farm bureau contest committee of the Exeter district offered five prizes totaling $75 to the boys or girls who would collect the greatest number of eggs of "linnets and sparrows," the adult bird head to be counted as four eggs and the young bird as two eggs.

Newspapers contained such statements as the following:

"The injury is not spasmodic, it is continuous; it is not assumed, it is actual. One Strathmore grower reports $30,000 loss. Another declares his tragedy plums are a total loss. The damage is in apricots, plums, peaches, almonds, grapes and is now hitting the prunes. The damage is greatly on the increase and reports indicate that three-fourths of the deciduous crop of the Terra Bella district has been eaten out by birds.

"One woman writes that last year she picked 16 tons of prunes from a small acreage and that by actual count this year she had 15 blooms on the whole orchard—the buds eaten by birds.

"Sentimentalists must give way. We are told the birds are not to blame, that blight has struck the trees. Blight does not attack plums and yet entire orchards of plums have not a single fruit bud on the trees. The condition is throughout the whole state, not in Tulare County alone. It is most serious.

"We believe we humans are the fittest and should survive. We must protect our crops if we are to survive. Our livelihood and existence depends upon pest control.

"We are told birds control the insect pests. They do not. Birds are more inclined to carry insect pests from one section to another. They carry noxious weed seed all over the country, such as mistletoe, larkspur, morning glory and Johnson grass. Real insect pest control is done by other insects."—*Visalia Delta*, March 23, 1927.

Another interesting feature of the campaign was that statements defending the bluejay and other so-called predatory birds were as follows: "Duck clubs offer a premium to the club that will destroy the greatest number of jay and butcher birds. These have a real and economic value to the farmer as they destroy many destructive birds and their eggs." Thus was put forth a new version of the predatory bird controversy.

One rancher in the district finding destruction of the birds by shooting and poisoning very difficult, worked out a unique method of frightening the birds from his trees. Placing a tall tower in the center of the orchard, he stretched long wires in every direction. On these wires were hung gallon cans filled with rocks. By pulling these wires in the tower, sufficient noise and motion was made even at the far corners of the orchard to frighten the birds away.

Not only did letters pour into the horticultural commissioner's office relative to damage done by birds, but also bird students drew attention to the danger of destroying insect-eating birds and of soliciting the aid of boy scouts in the destruction of birds given protection by state law.

Here, then, is the stirring up of an old controversy. Orchardists maintain that birds are causing thousands of dollars of loss. Bird students, who are supposed to have examined the stomachs of birds to find out exactly what they eat, defending them,

FIG. 44. A rancher in attempting to frighten bud cutting birds from his orchard erected this tower in the center and stretched wires to the far corners of the orchard. On the wires were hung gallon cans filled with rock and sand. A pull of the wire rattled the cans and drove off the birds. Photograph by H. C. Bryant, April, 1927.

maintain that it is dangerous to disturb the balance.

A survey of the situation leads us to the following conclusions:

1. Local damage to buds on fruit trees due to the depredations of birds was apparent.

2. The campaign in Tulare County was handled in an unfortunate manner because

a. Boy scouts were asked to destroy birds protected by law.

b. Farmers were urged to use poison in the destruction of birds which is a violation of state law.

c. The original resolution by the Exeter Chamber of Commerce was worded in such a way that it was misconstrued by newspapers and by all who read the resolution.

d. A contest stimulating the destruction of the eggs of "linnets and sparrows" led to the destruction of the eggs of valuable sparrows in addition to destructive ones and was a blow to the years of endeavor to teach children to protect birds rather than to destroy them.

3. There was little effort made to determine the exact stomach contents of the birds destroyed, and consequently no progress was made in knowledge as to whether the birds were being killed on circumstantial evidence or as a result of real knowledge of their food habits. One orchardist presented as evidence, five different species of birds—western robin, gambel sparrow, California towhee, Sierra junco and linnet. When the stomachs of these birds were examined by one accustomed to analyzing the food of birds, no evidence was secured of buds having been taken. The stomachs contained small grain, seeds, herbage and some dried grapes.

The following splendid saying by Herbert Spencer might well be pondered by adherents to both sides of the controversy: "There is a principle which is a bar against all information, which is proof against all argument and which can not fail to keep a man in everlasting ignorance. This principle is *contempt prior to examination.* When cause for a similar controversy arises, we hope there will be fewer accusations and greater endeavor to solve a real problem by getting at the truth by way of scientific research.—H. C. Bryant.

MILLIONS OF HUNTERS.

More than 5,150,000 hunting licenses were taken out during the season of 1925-26 by sportsmen throughout the United States, including Alaska, and the returns to state treasuries amounted to more than $6,800,000. Although data are lacking from several states, detailed figures for the season, compiled by the Biological Survey of the United States Department of Agriculture, show increases in the numbers of licenses issued and fees received over the two years preceding. In the 1923-24 season the licenses numbered 4,395,038 and the fees paid were $5,594,982. One year later 4,904,740 hunters paid for their licenses a total of $6,190,863.94. During the 1925-26 season the license figures were 5,168,353 and the fees paid totaled $6,872,812.59. Pennsylvania, with 525,045 licenses and fees of $646,467.25, headed the list both in licenses and returns to the State treasury. —*The American Field*, April 16, 1927.

MIXING FAUNAS.

Current literature contains the lament of many zoologists to the effect that plant and animal life is becoming so badly mixed up, owing to introduction of exotic species, that the scientist of the future will have difficulty in recognizing what is native and what is not. An article by Dr. L. R. Dice (Journ. Mamm., Vol. 8, No. 2, pp. 90-96, 1927) entitled "The Transfer of Game and Fur-bearing Mammals from State to State, with Special Reference to the Cottontail Rabbit," calls attention to the large number of eastern states that have introduced rabbits from Kansas. During the years 1924-25, the Board of Game Commissioners of Pennsylvania purchased in Kansas and Missouri, and liberated within that state, 58,404 rabbits. There follows a discussion of the danger of hybridization and the danger of the introduction of disease. Dr. Dice's closing paragraph is as follows:

"There are undoubtedly occasions where the restocking of a state from foreign sources is desirable, but in the case of the cottontail rabbit, and probably for most other species, the introduction of foreign stock is unnecessary; it is undesirable from the standpoint of science and of the preservation of uncontaminated wild life; it may introduce contagious diseases; and it probably will cause the hybridization of diverse subspecies, leading to the production of mongrel offspring. I would therefore recommend caution, and before introducing mammals from other states I would advise a thorough study of the probable results by competent experts. Finally I would urge, if introductions are made, that complete records be kept of the subspecies brought in, of the source of origin, and the number of individuals introduced, and of the places of liberation."

DIRECTORY OF BIRD-LIFE OF THE SAN FRANCISCO BAY REGION.

Interest in bird study has been rapidly increasing in California. Many applications come to the state university for an outline of a reading course on birds. What really constitutes such a reading course has just

been issued under the title, *"Directory to the Bird-Life of the San Francisco Bay Region."

The authors are Joseph Grinnell of the University of California, Museum of Vertebrate Zoology, and Margaret W. Wythe, assistant in the same institution. In the preface the authors state that the purpose of the contribution is to provide help and incentive toward the increased knowledge of the bird life in the San Francisco bay region. In addition to furnishing a list of the birds of this area it brings together facts and citations useful to the student. Of particular value is the index feature of the paper, citations being listed under various locality headings. The preface closes by deploring the meager recorded knowledge relative to the life history of even the commonest birds and the hope that the field observations listed in the book would stir others to like activity.

The introductory pages deal with a description of the territory involved, the nine counties surrounding San Francisco Bay, and with available books.

In the main part of the volume is given a general directory including all the species and subspecies of birds known to have occurred anywhere within the area. Only such records as have been published or were available at the university museum have been mentioned. Each species is treated in a uniform system which includes: Common or vernacular name, scientific name, definition of seasonal status, relative abundance, geographic occurrence, places where there is a fair prospect of finding the bird in question, the local habitat preferences and references to published literature.

The summary shows that 383 different varieties of birds (species and subspecies) have been found in these nine counties. Of this number, 121 are permanent residents, 44 summer residents, 131 as winter visitants, 38 as regular transients, 24 as vagrants, 20 as an accidental occurrence, 3 as extinct and 2 as non-native.

The book ends with the following constructive words: "On the whole, it looks as though the total number of species in the Bay region at the present time were undergoing decided reduction, due in major part to the elimination of habitats of wide diversity or of productive kinds. There is little doubt, too, that the aggregate number of individual birds, of all species together, is also becoming less, due to the expansion of closely built-up urban areas where practically no undomesticated bird life of any sort can exist.

"Even though such changes in the direction of diminution are in large part inevitable, they can and should be compensated for in so far as is practicable by the establishment of parks and natural preserves here and there, such as Muir Woods, and by the spread of popular appreciation of bird life as a community asset, so that general protection and encouragement of this asset for its esthetic and other values will become second nature throughout our citizenry."—H. C. B.

*Grinnell, Joseph and Wythe, Margaret W. 1927. Directory to the bird-life of the San Francisco Bay Region, Pacific Coast Avifauna No. 18, 60 pp., 1 pl. May be purchased from W. Lee Chambers, Business Manager, Drawer 123, Eagle Rock, Los Angeles County, California.

ANSWERS TO QUESTIONS ON PAGE 197.

1. Yes! Provided an affidavit signed by three witnesses is furnished, proving that the lions were taken in the State of California.

2. No! Domestically raised quail are better as aviary birds, and are procurable from game breeders.

3. No! Unless you are a commercial fisherman, fishing for profit. Only one license, an angling license, which will cost $2 beginning January 1, 1928, is necessary for those who fish for pleasure.

4. The sardine is the basis of California's greatest fishery. Fishermen alone collect more than a million and a half dollars for the sardine catch.

5. The Oregon ruffed grouse, found in eastern Siskiyou, Humboldt and Trinity counties.

6. No! The catfish is not named as a game fish in the fish and game laws of California.

7. Some trout are migratory. The steelhead trout spends part of each year in the ocean, but lays its eggs in fresh water. Experiment has shown that trout in the Pit River are non-migratory.

8. Experiment has shown that most trout will survive after being caught, if not too deeply hooked.

9. No! Unless the stream is barren of fish life. State planted fish can not be appropriated for a preserve.

10. The sage hen or sage grouse, the largest member of the grouse family in America.

11. *Ursus americanus*, the same as that of the black bear, for the cinnamon bear is but a color phase of the black bear.

CALIFORNIA FISHERY STATISTICS LAUDED.

Most of the middlewest states were represented recently at a Great Lakes Fisheries Conference which met at Lansing, Michigan, March 3, 1927. United States Commissioner Henry O'Malley acted as chairman. Approval was given and a number of regulations designed to equalize laws relating to the tak-

ing of fish in the Great Lakes. These regulations had to do with the use of gill nets and with size limits. Approval was also given to provisions designed to prevent pollution.

Of particular note was the following resolution which advocates the California method of handling fishery statistics: "It is the consensus of opinion of this meeting that the states should make provision for the collection of fishery statistics in such form that the statistics of one state will be comparable with those of other states adjoining the lakes so that the trend of these fisheries may be determined, comparisons of productivity per unit of effort made possible, and such other data as the biologists may require in following the trend of the fisheries and determining the need for more stringent or less stringent regulations as the case may be. A plan similar to the California system is recommended. Those making returns should do so under oath."

FIG. 45. The home of the "Jerky Hermit" near Island Mountain, Trinity County. Deputy J. H. Hellard seized 180 pounds of jerky in this camp.

THE RELATION OF BIRDS TO FORESTS.

The summary of a bulletin entitled "The Relation of Birds to Woodlots in New York State," by W. L. McAtee (Roosevelt Wild Life Bull. 4, No. 1, pp. 1-148, illus.) contains the following terse sentences which have the backing of one of the best known economic ornithologists in America.

(1) Birds are indispensible agents in the natural dissemination of trees reproducing themselves by fleshy fruits and nuts, and they aid also in the reseeding of coniferous trees; (2) birds are the most important natural check on tree-destroying rodents; (3) birds are of great value in cutting down the numbers of an enormous variety of insect pests of the forest; (4) game birds of the woodlot are a source of increased revenue; and (5) bird life in general by making woodlands more attractive contributes to recreational values, both esthetic and material.

Evidently birds are a great asset to woodlots, and as such should be conserved. They can be protected, attracted to woodlots, and encouraged by simple and economical methods. Their care should be made a part of routine woodlot management. The constantly rising value of woodlots and their products fully justifies this care of birds especially since the activities of birds, for the most part, react so favorably upon the welfare of woodlands.

A "JERKY" HERMIT.

Information came to me in the winter of 1915 that jerky was being put on the train at Island Mountain in southern Trinity County and was being handled by the newsboys of the Northwestern Pacific Railroad. Suspicion fell upon an old hermit, William Hughes, who lived across the river from the railroad about six miles upstream.

In February, 1916, an attempt was made by Deputy Earl Barnes and myself to investigate this man's camp but a very severe

storm caught us and the trains failed to get through so we had to abandon our trip.

In April of the same year, the matter was again taken up. A search of the hermit's place failed to reveal anything. However the jerky continued to appear on trains. In the years following, work as I might, I could not locate the source of supply.

However, in the latter part of June, 1922, I learned that Hughes had a large supply of jerky just about ready to ship. I left Willits at two o'clock, walked down the track and crossed the river to Hughes' place. He was not there but had been the night before. A search of the place was made and about 180 pounds of jerky and the carcasses of seven deer were found around the place. There were two old mother skunks on long chains and each mother had six half grown kittens.

There was nothing for me to do but just wait for Hughes to return. I want to tell you that this was the longest wait I ever experienced. I surely thought it was days instead of hours. It was a hot day and the combination of the odors of deer carcasses and skunks, together with the flies were anything but pleasant.

Hughes finally arrived about eight o'clock in the evening. After arresting him I induced him to carry part of the jerky while I took the rest. We started for Ramsey station, which we reached about midnight.

The nearest justice was at Ruth, Trinity County, which meant a trip to Fortuna by rail and then stage from Fortuna to Ruth, about 160 miles.

Hughes escaped during the wait for the train and has not been heard of since. He was fifty-six years old and had lived in this place for 14 years.

In front of the tent to the right in the picture is a large rock against which he built his fire and over which he had some boards and old canvas. The tent was made of paper roofing and old sacks and was about seven by nine feet and about five feet high. His utensils were old cans and one frying pan. Near the tuft of grass at the corner of the tent is a spring.—John H. Hellard.

GAME PROPAGATION IN WASHINGTON.

The following figures will show the number of birds propagated at the two state game farms operated by the Division of Game and Game Fish of the State of Washington for the years 1925 and 1926.

The figures given indicate the number of birds propagated and do not include at all any purchases, or birds obtained by means of exchange or any other way. In 1925, however, Chinese pheasants to the number of 2730 were produced by two game farm licensees indirectly by means of help given by this division in disposal, for it sometimes proves the case that with help given by this division in an indirect way, a game farmer is enabled to propagate a considerable number of birds, but these figures are not included in any figures showing production of the state game farms:

1925—	
State game farm near South Tacoma	6,615
State game farm at Walla Walla	6,158
1926—	
State game farm near South Tacoma	9,484
State game farm near Walla Walla	6,099
Grand total—number of ring-necked pheasants propagated for the seasons of 1925 and 1926	28,356

The propagation of the ring-necked or Chinese pheasant is the main activity of both of these game farms, although in connection therewith such fancy pheasants as the Lady Amherst, Reeves, golden and silver are likewise propagated and the number of such that were reared during the two years in question was 250. And a limited number likewise of other game birds such as Hungarian partridge, quail, etc., were produced, but these latter activities are always secondary for the propagation of such is not allowed to interfere in any way with any of the ring-necked pheasants.

SPECIFICATIONS FOR STATE GAME PRESERVES.

To be the most effective and prompt in increasing the supply of game, the new state game preserves—

1. Should be located in relatively large areas of wild land, having fair to good cover, so that the increase of game may spread out from the preserves and occupy the surrounding territory without difficulty or interference.

2. Should be located on relatively fertile lands, carrying a variety of natural growth and capable of producing large quantities of wild-life food supplies, natural and introduced.

3. Should be located so as to include a generous acreage of winter cover (usually cedar swamps) and, where practicable, they should have rough hardwood as well as pine land adjoining and easily available.

4. Should contain generous supplies of living water, which is easily available.

5. Should be so located and laid out as to make fire and other protection easily practicable at low cost (as for fire line construction, patrol, against trespass, etc.).

6. Should have, at present, at least a fair stocking with wild life, especially partridge and deer, so that artificial stocking will not be necessary.

7. A standard preserve should contain a centrally located, permanent refuge or sanctuary, with boundaries well posted, and further marked with a strand of wire.

The refuge or sanctuary should contain four to ten sections (2500 to 6500 acres, more or less).

Surrounding the refuge there should be a zone of state-owned land to be used as public hunting ground, and at least a mile in width, so as to make the total acreage of a standard state game preserve (refuge and hunting ground together) 10,000 to 18,000 acres, more or less.

8. To the extent practicable, lands already owned by the state should be used in building up the new preserves.

9. The first locations of new game preserves can best be made in counties covered by the Land Economic Survey, the maps of which show the full detail of cover, improved lands, assessed values, state ownership, etc.

10. Other things being equal, new game preserves should be located—

a. Where they will serve most promptly and effectively in maintaining and increasing wild life supplies.

b. Where local cooperation, as from land owners, sportsmen associations, etc., will secure satisfactory lands, at low cost or by donation, so as to involve a minimum of delay and expense in getting title to the land and in getting the new preserves under active administration.

11. When fully developed, each standard game preserve should have a resident keeper, a system of permanent fire-breaks, intensive vermin control, and such clearing and planting as needed in order to insure adequate wild life food and shelter during all seasons of the year.—Bienn. Rpt. Dept. of Conservation, Michigan, 1925-1926, pp. 189-191.

VERMIN AND QUAIL.

No list of vermin enemies can be compiled that will apply to all parts of the range of the bob white quail. Each locality must be studied separately.

The Cooperative Quail Investigation, that has confined its operations to southern Georgia and northern Florida, has assembled a mass of important facts of value to sportsmen and owners of quail preserves in that part of the country, which were reported by Herbert L. Stoddard, in charge of the investigation, at the recent National Game Conference of the American Game Protective Association in New York.

It has been found that the skunk is the most destructive to quail nests and that the cotton rat comes next, but the latter would not be encountered at all farther north. The cotton rat is also a competitor of the quail for its food supply. Raccoons and opossums rob quail nests, but the former confines its depredations to the vicinity of streams where quail do not nest abundantly. The opossum, however, ranges widely and is extremely prolific.

House cats and cur dogs take eggs and young and adult birds. Five species of snakes were found destructive, coachwhips, black snakes, gray colubers, red colubers and pine snakes taking quail of all ages and their eggs. These snakes also destroy the cotton rat. Only two species of hawks, the Cooper and sharp-shinned, were found destructive, though other hawks will occasionally take a quail. In this investigation the marsh hawk was found to be a valuable ally in keeping down the cotton rat and that it seldom killed quail when rats were available.

Observation of the crow proved it to be a serious enemy, especially in scant cover where quail nests are not well concealed. It is doubtful if it compares with some other enemies in good cover. Evidence was also secured against the weasel.

Persistent trapping can keep the furred species under control, but poisoning must be resorted to in order to keep down the cotton rat, especially when rodent-killing species have been depleted.

The question of vermin control is a very complicated one and the results of the Cooperative Investigation at this point can not be taken as a criterion for all other localities, where conditions may be entirely different. Where quail are to be maintained in large numbers, so that shooting is warranted, the nesting of the birds must be made as safe as possible, and those species of vermin that are found to prey upon the nests must be kept under control.

That does not mean that general, widespread campaigns of extermination are ever warranted, as the species which interfere with the increase of quail may be benficial or harmless in other localities where quail are not found.

It is manifestly a matter of administering each locality as a unit after full investigation, in other words, a matter of game preserving on each separate area.—*The American Field*, Vol. 107, No. 8, pp. 196-197.

A BRIEF FOR THE PHEASANT.

The Idaho State Game Department in an effort to determine the amount of damage done by Chinese pheasants arranged to have a southern Idaho farmer shoot one male pheasant each month during the year. The man selected to make this experiment was C. F. Thacker and the crop of each bird killed was turned over to S. T. Queen, an instructor in the Napa, Idaho, high school. Queen analyzed the contents of the 12 crops and made a detailed report to the department.

The pheasant's diet would probably be indorsed by most dietitians for balance if not for all ingredients. For the most part it consists of wild seeds and leaves. But it also contains a great many bugs. Weeds and beetles suffer quite heavily at the game

bird's hands. In May the bird had swallowed 117 alfalfa weevils.

Corn was found in the crop only in February and December, while wheat appeared in March, August, September and November. A great deal of the wheat was in the hulls and it is believed that these grains were principally gleanings of the field. In only one month was the crop empty. That was June. Perhaps the first warm sun had made the bird a little lazy.

The detailed report follows:

January—Dandelion leaves, 399; small dandelion plants, 6; grass blades, 68; small grass plants, 4; lamb quarter seeds, 37; small seeds with hulls, 569; wild oat seeds, 2; ironweed leaves, 126.

February—Grains of corn, 37; ditch snail, 1; grass blades, 7; ground cherry, 1.

March—Lamb quarter leaves, 4; wheat grains, 6; wheat grains in hull, 102; grass blades, 5; wheat beards, 14; ground fern plant, 1.

April—Alfalfa leaves, 22.

May—Alfalfa weevil, 117; small beetles, 10.

June—Empty crop.

July—Clover leaves and stems, 63; grasshoppers, 8.

August—Wild millet seeds, 952; blue grass seeds, 39; clover leaves, 20; wheat grains, 56; wheat in hulls, 20; red ants, 17; small beetle, 1; small rocks, 2.

September—Wheat, 94; wild millet, 427; alfalfa leaves, 14; thistle seeds, 2; spider 1; small rocks, 2.

October—Barley, 43; wild millet, 480; buckthorn, 49; grasshopper, 1.

November—Wheat in hull, 106.

December—Barley, 23; corn, 14; wild millet, 168; grass blades, 31.

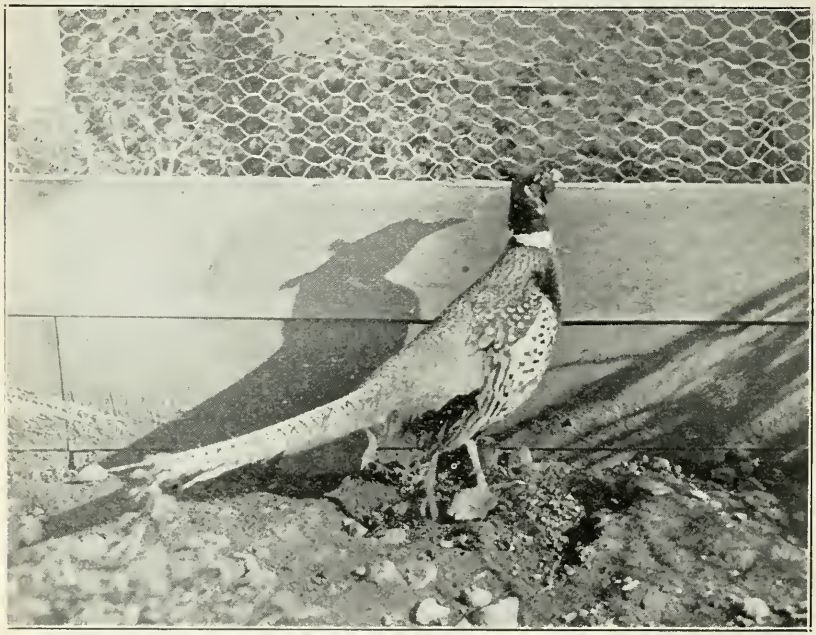


Fig. 46. Male ringneck pheasant in breeding plumage. State Game Farm. Photograph by H. C. Bryant, May 5, 1927.

THE FOOD OF TERNS IN ENGLAND.

Fish eating birds are continually accused of affecting the fish supply by depredations. The following review under the title "An Investigation of the Food of Terns in England," (The Auk, July, 1926) is pertinent to the subject and shows that circumstantial evidence is not always supported by investigation, and that some other factor may be responsible for seeming decrease in food fish.

More or less parallel increase in a colony of terns at Blakeney Point, Norfolk, and decrease in fishes, especially commercial flat fishes, persuaded the fishermen that they stood in the relation of cause and effect. In response to complaints an investigation was carried on during the breeding season of 1925, and the stomach contents of 55 terns of three species collected during the period were examined by Dr. W. E. Collinge. His report with appendices from the committee in charge and by an *amicus curiae*, J. W. Allen has recently been published. Dr. Collinge found no flat fishes

whatever in any of the stomachs examined, so inevitably concludes that the terns have nothing to do with the decrease in the commercial catch of such fishes. Marketable fishes composed about a fifth of the food of the three species of terns, fishes locally consumed, a sixth, crustaceans and worms a little more than half, and insects and miscellaneous animal food the remainder. Interesting data on other phases of the life history of terns than the gastronomic, are also, included in the paper. Dr. Collinge's summary is:

"It seems clear that any shortgage of inshore fishes at Blakeney Point can hardly be accounted for by the presence and preservation of terns.

"If the absence of inshore fish were due to the terns, then we should also have a scarcity of sand-eels, various crustacea, annelids, and marine molluscs, whose percentage far surpasses that of the food fishes eaten, but there are no such signs.

"We are, therefore, thoroughly convinced that the recent scarcity of flat fish at Blakeney Point is due to some other factor, and feel certain that if the whole of the tern population of Blakeney Point were to migrate elsewhere, the result would not be marked by any increase in the fisheries.

"To those acquainted with fishery investigations, these migrations or diminutions are nothing new and their cause or causes still remain unsolved, but of one thing we are quite certain, viz., that the feeding habits of terns or any other sea-birds bear no relation to them."—W. L. M.

GAME AND FUR FARMERS AIDED BY U. S. SCIENTISTS.

The decrease in areas in the United States suitable for wild fowl breeding grounds emphasizes the need for propagating wild ducks, geese, and other birds on game farms. The Biological Survey of the United States Department of Agriculture for many years has encouraged measures to this end, and its latest help for game breeders is a Farmers' Bulletin (No. 1521-F) just issued under the title "Propagation of Game Birds."

The bulletin points out that the possibilities of game-bird propagation have long been recognized, both abroad and in this country, and that enough has been accomplished to prove that increase in successful game farming is limited only by the area, the expenditure, and the effort devoted to it. Many methods that assure success are known, and these are treated concisely in the new publication.

The Biological Survey's activities in promoting game farming are to be noted in a greater number of official publications of the United States Department of Agriculture and in special mimeographed leaflets on particular phases of the subject. A review of these reveals no less than 65 titles, covering the propagation of birds and of fur and game mammals. These bulletins and leaflets have been devoted either wholly to the purpose of increasing the number of these valuable birds and animals through artificial propagation or have made favorable mention of the subject in compiling facts to aid in the solution of the game breeder's problems. Chapters on propagation have been included in all the bulletins containing the annual summaries of the game laws of the United States and Canada for more than a quarter of a century.

Ever since the activities of the Department of Agriculture were extended to game preservation, in 1900, recommendations have been made in publications of the Biological Survey favorable to importations of game birds and eggs for propagation, and the necessary importation permits have been issued. With the passage of the migratory bird treaty act of 1918, the Biological Survey began issuing permits for the possession for propagation on farms of such waterfowl as twice each year pass back and forth between the United States and Canada on their migratory flights.

Investigations are now being conducted in southern states for increasing the supply of bobwhite quail, including a study of the control of diseases and of natural enemies of the birds. Investigations also are being made of practical methods of capturing beavers alive and planting colonies in areas where they will not only not be destructive to forestry and agricultural interests, but where they can make lands that are otherwise useless productive of valuable and interesting fur bearers. All phases of fur farming are being studied and recommendations on the subject offered in a number of bulletins. Special studies also have been made for the improvement of Alaskan reindeer, and experiments are now under way in cross-breeding with native wild caribou, with a view to developing stronger and heavier reindeer with increased meat weight.

Preliminary to a still more active educational campaign in the interests of game bird farming, the Biological Survey is sending W. L. McAtee, author of its bulletin on "Propagation of Game Birds," to certain European countries. During the next three months he will visit world-famous places in Holland, Germany, France, and England to investigate the propagation there of migratory waterfowl, some of which are of the same species as occur in the United States. The methods and equipment used will come under his observation and study, both as regards American species of birds propagated there, and those species that have rarely or never been introduced and raised in this country.

In addition to the recommendations made for rearing the game birds treated in the latest bulletin, such as pheasants, quail, ducks, geese, partridges, grouse, wild turkeys, and swans, the Biological Survey has issued instructions both in its publications and in its demonstrations for rearing many other useful species of wild life on game and fur farms, such as deer, elk, reindeer, silver and blue foxes, muskrats, hares and rabbits, skunks, martens, minks, otters, opposums, raccoons, and beavers.

The number of persons now breeding game birds and other forms of useful wild life for commercial and personal use is rapidly increasing, and many owners of large country

estates are interested in our beautiful species of wild fowl and in perpetuating them while it is still possible. Practical information of value to prospective game breeders is to be found in many publications of the department still available for distribution and more will undoubtedly be developed from the studies now being made in Europe.

A leaflet issued about ten years ago and kept revised, listing publications of interest to game breeders, and one listing publications on fur and fur animals will be furnished applicants free on request addressed to the Biological Survey, United States Department of Agriculture. Farmers' Bulletin (No. 1521-F), "Propagation of Game Birds," supersedes several former bulletins and leaflets, and will be sent to anyone on request as long as the supply for free distribution lasts.

REVISED HUNTING AND TRAPPING REGULATIONS ISSUED FOR ALASKA.

Revised regulations relating to game animals, land fur-bearing animals, and birds, in Alaska, recently adopted by the Secretary of Agriculture after recommendation by the Alaska Game Commission and approval by the Biological Survey, become effective in the territory on July 1. Only such changes were made in the previous regulations under the Alaska game law as seemed necessary to meet changing conditions and to correct defects. Although all the changes are important in certain areas, only the following four of the fourteen made are of general interest:

The caribou season in that part of fur district No. 2 north of the summit of the Alaska Range and Ahklun Mountains now opens on August 1 instead of September 1, ending on December 31 as heretofore.

The period September 1 to June 20 is fixed as the open season on black bear in fur district No. 2, but in that portion of the district south of the Alaska Range and Ahklun Mountains a bag limit of two during the month of September is prescribed. This change lengthens the season approximately 7 weeks in the southern portion of the district by permitting black bears to be taken during the month of September and as late as the 20th of June. The open season was formerly October 1 to May 31 in that area.

The opening and closing dates of seasons on certain fur bearers in designated areas were changed to meet local conditions. The most important of these is the provision opening an area in east central Alaska to beaver trapping during the month of April, with a seasonal bag limit of 10 beavers to each trapper.

Nine small areas adjacent to Alaska Railroad are designated in which the taking of fur-bearing animals and game is prohibited. These areas, by executive order of February 21, 1927, were set aside as preserves and breeding grounds especially for beavers and muskrats, in order to retain them as attractions to travelers along the line of the railroad.

By recent changes in the migratory bird treaty-act regulations, a continuous close season for two years is placed on greater and lesser yellow-legs both in the several states and Alaska and this amendment has the effect of abrogating the provisions of the Alaska game regulations with respect to seasons and bag limits on these birds.

The complete text of the new Alaska regulations including maps showing the districts and the text of the Alaska game law (Alaska Game Commission Circular No. 3) may be obtained free, as long as the supply lasts, from the United States Department of Agriculture, Washington, D. C., or from the Alaska Game Commission, Juneau, Alaska.

UNIFIED PLAN FOR ELK CONSERVATION.

For years the conservation of the elk herds ranging in the vicinity of Jackson Hole, Wyoming, has been a source of great concern. These herds, now believed to number approximately 30,000 head, are a great economic asset of national importance but their existence is jeopardized through the continued restriction of the winter range and the lack of a long-term method of game management. The summer range, largely within federal and state reservations, is regarded by federal officials as sufficient. The problem is to restrict the numbers of elk to the available food supply. Under present conditions great numbers starve to death on the winter range during severe weather. Such an unnecessary waste of a natural resource is considered deplorable.

Through the efforts of the state of Wyoming, citizens of Wyoming, the United States Biological Survey, and the Isaak Walton League of America, the herds have been maintained by the winter feeding of hay in Jackson Hole. But the problem of starvation is recurrent and can only be solved by a coordinated plan of management worked out by all agencies interested.

REEDBIRDS, OR BOBOLINKS, NO LONGER PERMITTED TO BE KILLED.

By an order of the Secretary of Agriculture it is no longer permitted to kill reedbirds, or ricebirds, known in the North as bobolinks. In 1919, owing to serious depredations of bobolinks on the rice crops of North Carolina, South Carolina, Georgia, and Florida, permission was granted by the Secretary, under authority of the migratory bird treaty act, administered by the Biological Survey of the United States Department of Agriculture to

kill these birds in Pennsylvania, New Jersey, Delaware, Maryland, the District of Columbia, North Carolina, South Carolina, Georgia, and Florida for the protection of rice growers. This permission is now revoked.

Under the new order, a person or members of his immediate family or bona-fide employees, owning or leasing lands in North Carolina, South Carolina, Georgia, or Florida on which rice is being grown, may shoot bobolinks or ricebirds, only when authorized by a special permit issued by the Secretary of Agriculture and countersigned by the chief official in charge of the enforcement of the fish and game laws of the state in which the permit is effective, and only during the period from August 16 to November 15, inclusive, on rice fields where such birds are seriously injuring the crops. The birds so killed may be consumed as food, but may not be sold.

COUNT OF JACKSON HOLE ELK MADE BY OFFICIALS.

A count of elk in the Jackson Hole, Wyoming, herd has been completed by members of the Biological Survey and the Forest Service, of the United States Department of Agriculture, and the State Game Commission of Wyoming, accompanied by representatives of the Izaak Walton League of America. Reports of the count to the department show that the herd now numbers 19,238, a total that is only slightly different from the figures resulting from a similar count made two years ago. At the time of the count nearly half the elk were on the feeding grounds of the winter refuge maintained by the Biological Survey. That the herds are still within the optimum number of 20,000, set by the recent Elk Commission created by the President's Conference on Outdoor Recreation, came as some surprise to government officials. They state that in a disastrous winter six years ago thousands of elk died from starvation, leaving a remnant of only 9346, as noted in a count then made under the same auspices as the one just completed. A doubling of the numbers between 1921 and 1925, when the count showed 19,483, suggested that a continued increase might be expected, especially as recent winters had been favorable to the elk and comparatively few had been killed by hunters.

Unexpected results like these, according to officials of the Biological Survey, emphasize the necessity of a thorough-going study and general investigation of all conditions affecting the welfare of the great herds of elk of the whole Yellowstone region. Following out the recommendations on this matter made by the recent Elk Commission, the Biological Survey is formulating plans for beginning the work. Information will be assembled regarding all factors affecting fluctuations in the numbers of the elk.

Biologists of the government point out that the southern Yellowstone elk in winter migrate for the most part southward to the vicinity of Jackson, Wyoming. Several hundred, however, have recently been reported west of the Tetons in Idaho, and there is some intermingling eastward in Wyoming with herds along the Wind and Green rivers, which may account for the apparent lack of increase in the numbers about Jackson. However, an insufficient crop of hay produced on the elk refuge, even if supplemented by the purchase of hay by the state game commissions in an unusually severe winter, could easily bring about a repetition of former disasters, when an overconcentration of elk on limited areas exhausted for all of them the forage that would have supported normal numbers.

It is to prevent the starvation of elk by thousands, disasters that all but wipe out the herds, that the official and individual conservationists interested are working. Present plans call for maintaining the Wyoming herd in numbers not to exceed 20,000 and preventing an accumulation of what could easily become an unwieldy surplus, threatening through starvation on a large scale the existence of the herd in even optimum numbers. The present count, though not yielding the large figures that had been anticipated, shows that the Wyoming elk have for two years been close to the danger line in abundance, a point beyond which they can not advance without threat to the permanence of the herd as a whole.

CALIFORNIA FORESTS, ONE OF THE STATE'S GREATEST NATURAL RESOURCES.

California's forests have produced far greater wealth than the combined output of her world-famous mines, according to a descriptive bulletin, "The National Forests of California," which has just been published as Miscellaneous Circular No. 94-M, by the Forest Service, United States Department of Agriculture. The annual value of the lumber products of the state is about $62,000,000.

"The Spanish explorers who were attracted to California in the early days were right in their assumption that the region possessed wealth beyond the dreams of avarice," says the bulletin, "but they missed the one kind of wealth they sought—gold—and they failed to realize the wealth that is in her forests and waters, wealth now being derived from a thriving timber industry and from prosperous irrigated farms and orchards."

The eighteen national forests of California cover nearly one-fifth of the total area of the state and contain resources valued at $300,000,000 not taking into account their value in protecting the mountain watersheds

upon which depend nearly all the actual and potential major irrigation and hydroelectric power developments of the state, and the continuity of municipal and domestic water supplies.

The national forests in California are managed with a view of perpetuating their vast resources. In all lumbering operations on the government's forest lands only the mature trees, previously designated by forest officers, are cut, and precautions are taken in felling and slash disposal to protect the young growth from fire or other injury. Every effort is made to keep the lands producing timber up to their full capacity.

California was one of the earliest states to give thought to the care of her natural resources and as early as 1850 the best thinkers of the state were urging scientific care of the forests. Notwithstanding this fact there are nearly a million and half acres of privately-owned cut-over lands in the state now producing but a small part of the timber that could be grown on them. Also some 50,000 acres a year of privately-owned forest are now being logged off, of which at least 40 per cent is left in an unproductive condition.

Stock raising is the oldest industry in the state, and at one time was attended by violence and range wars, says the bulletin. Today the Forest Service effectively regulates the grazing on 24,000,000 acres of government and private lands within the national forests.

The circular gives an interesting account of the early history of California's forests, the national forest resources in the state, the value of forage in the forests, recreation possibilities and scenic attractions, wild life, the administration of the national forests, the development of forest roads and trails, the causes and means of preventing forest fires, and production and consumption of lumber in the state.

Copies of this bulletin may be obtained free of charge, as long as the supply lasts, from the District Forester, U. S. Forest Service, Ferry Building, San Francisco, California, or from the United States Department of Agriculture, Washington, D. C.

Commission Activities.

During March a tentative four-year budget was presented to the State Board of Control by Executive Officer Greene. This first attempt to present a definite program to the legislature met with instant commendation. An analysis of this budget was mailed to all of the newspapers and to sportsmen's organizations.

The end of the fiscal year found the various departments thoroughly equipped, the old hatcheries rebuilt and put in proper condition, several new hatcheries completed and the State Game Farm fully equipped for maximum production. Furthermore, all expenditures were well within the budget.

During the month of March, O. P. Brownlow, deputy at Porterville for many years, was promoted to "Captain at Large" to take charge of fish planting of the Commission. Brownlow is well qualified for this work by years of experience in patrol and fish planting. He has changed his headquarters to San Francisco and is now traveling around the state, meeting with the captains and others interested in fish planting, and outlining his campaign.

Department of Patrol.

Pheasant dinners are costly affairs, as a hospitable native of Portugal learned to his sorrow during April. Deputies Charles Sibeck and N. Poole descended upon the young man with a search warrant after twelve persons had just finished a pheasant dinner. The wardens had been watching the young man's movements, but as he returned from hunting after dark, it was necessary to get the warrant. One pheasant was found that had not been used at the feast. Justice E. H. Barker of Galt fined the "poacher" $500 with the alternative of 180 days in jail. This pheasant dinner was certainly costly.

Captain of Patrol K. P. Allred has been assigned to a new district composed of Monterey, San Benito and San Luis Obispo counties. He took over the work on May 16, and has five deputies under him. The men are H. E. Black, Ralph Newsome, F. H. Post, J. H. Hill and J. P. Vissiere.

In considering the importance of planting trout several factors enter: First, we must not overlook extension work—barren waters and waters in inaccessible places must be stocked to provide a supply of fish for the future; second, minimum stream flow is a very important factor and should be watched closely—how useless it is to plant fish in a stream that is dry in August; third, in considering the needs of any stream we must always keep in mind the fact that the fish are the property of the people of the State of California. Thus does O. P. Brownlow, in charge of fish planting, sum up this difficult problem.

Jay Bruce, State Lion Hunter, has finished his work in southern California with ten "cats" to his credit. At present lion hunter Bruce is training dogs to replace some of his veterans, that have earned a vacation after long terms on the trail. Fox hounds are the preferred breed. Out of about eight he tries out he gets two dogs that will work. It takes at least two years and a kill of fifty lions to make a real lion dog. Sometimes a dog shows his class after a couple of the beasts have fallen, but it generally takes a lot longer. It is a tedious job. State Lion Hunter Bruce is regarded as an authority on hunting mountain lions and training dogs for this particular work.

Deputy E. D. Ricketts, of Los Angeles, estimated that there were 946 boats containing fishing parties on Big Bear Lake on May 1. This lake seems to be the most popular for anglers of southern California and approximately 200 limits of rainbow trout were taken the opening day.

A fine of $200 was recently assessed an angler by Justice Ray Baugh, of Salinas. This man had one hundred trout more than the legal limit of twenty-five in his possession when he was apprehended by deputies Fred H. Post and Ralph Newsome.

June Lake in Inyo County, a lake well-known to anglers is not to be open for fishing until June 1 after this year. An act to this effect was passed by this year's legislature. Having the lake closed until the end of May will afford the hatchery men an opportunity to secure a record catch of steelhead eggs next year. This year an area was marked off by a cork line in which no fishing was allowed so that the men from the Fern Creek Hatchery, which is located between Gull and Silver lakes, could secure fish for spawning. This marked-off area was guarded by Captain Clark and Deputy Bundock who camped on the shores of the lake, maintaining a twenty-four hour vigil, explaining to the anglers why the area was closed. The fishermen cooperated with the officers and the hatchery men were thus able to secure more than 1,000,000 eggs.

June Lake, although only a mile long and about one-half mile wide, yields to anglers at least one ton per day of fish, average of

four pounds each. The lake furnishes the necessary food, a freshwater shrimp, that thrives on the grassy bottom of June Lake, and also a black bug, similar to a ladybug. This together with the fact that the water has the right temperature and the lake is evidently fed by hidden springs, results in the production of a fine quality fish.

The dollar-a-year wardens are getting some effective results. A summary has been prepared by Walter R. Welch, in charge of the force, which shows that a territory of 66,964 miles has been covered resulting in 79 arrests and fines of $2,710 assessed. The men have rendered valuable assistance in checking licenses as well as in making arrests and seizures.

Department of Fish Culture.

Flood conditions make extra work for hatchery employees. During February, mud and trash was carried into the troughs of the Fort Seward Hatchery to a depth of two to four inches. For three days and nights the men had to be on duty constantly in order to keep the screens and flume clear. Removal of such debris must be carefully done to prevent injury of the fish in the troughs. Even southern California stations suffered. At the Bear Lake Hatchery water broke in the rear door of the cottage and filled it with five feet of snow and water. It also filled the hatchery and piled the troughs in every direction. Tops were torn from the permanent racks in North Creek. One hundred and fifty feet of supply flume carried away and supports torn from the remaining flume.

The Kaweah Hatchery was moved early this spring to its original location at Power House No. 1 where the water supply is much better. The Tulare County road crew kindly built 800 feet of road from the Giant Forest Highway at Hammond to the hatchery, the Commission paying only for the labor, powder and culvert.

The spring take of trout eggs at the Klamath River auxiliary stations was very disappointing. The run was the smallest in years. Fall Creek which produced 274,000 eggs during March of last year produced but 24,000 during the same month this year.

High water did little damage at the Beaver Creek egg collecting station because of a dam with concrete piers and apron. More eggs were secured at this station than elsewhere but even this take was considerably less than that of last year.

At the Mount Whitney Station more than a million trout are on hand, 650,000 of which are eastern brook. A pond contains 150,000 rainbow trout that are nearly four inches in length having been held over from last year's hatch.

Fort Sutter Hatchery planted close to a half million salmon the latter part of March.

The Camp Creek Egg-collection Station on the Klamath River was badly damaged by February floods. The racks were completely swept away. Had not the county bridge, which was carried away by the swollen stream, lodged against the holding tanks and turned the water, the tanks and cabin would likewise have been carried down stream. It was necessary to build a new flume and make numerous other repairs, but the station was able to renew spawning operations by the middle of March.

The Hornbrook Station suffered more than Camp Creek. A washed-out county bridge swept away the concrete holding tank and the cabin. No trace of the cabin has been found and doubtless it went down the Klamath River. Not only was the station completely wrecked, but the creek shifted to a new channel some distance away. Repairs were made, however, and the station continued to function during the spawning season.

The unpreventable loss occasioned in holding trout in ponds is evidenced by the count of some fingerlings planted in Santa Cruz County streams during March. Last fall 101,000 steelhead were placed in a pond at the Brookdale Hatchery. When the ponds were drawn down and the fish moved to streams for planting, 57,000 were counted.

The Brookdale Hatchery has supplied other hatcheries with 583,000 steelhead eggs and has approximately 1,000,000 left.

Fair takes of eggs are reported from the Lake Tahoe Egg-collecting Stations in spite of the fact that high water damaged the traps. Heavy snow made it impossible to secure rock for making repairs and temporary resort was made to brush and gravel. The number of fish in the creeks tributary to Lake Tahoe is greater than at any time during the last seven years.

Fingerlings held in a tank on Blackwood Creek failed to grow satisfactorily owing to the lateness of the season and the extreme cold water. They were distributed during the spring months.

Biologist Coleman made a survey of Prairie Creek and tributaries in Humboldt County this spring to determine the com-

parative numbers of steelhead and cutthroat trout and to gather data on the spawning of cutthroat trout.

More recently he has been busy investigating an infection among some of the salmon fry at Mount Shasta Hatchery as well as studying the pathogenic condition of the trout fry in Brookdale Hatchery.

Department of Commercial Fisheries.

The spring lobster season in southern California ended with fewer violations being reported than ever before. The catch was light on account of stormy weather which destroyed the fishermen's traps. The Mexican fisheries extended their season one month so as to let the fishermen recoup their losses.

The State Fisheries Laboratory is securing a series of photographs of all of the fishes of commercial importance. Thus far seventeen species taken at San Pedro are on file. It is hoped this series of photographs will form the basis of an illustrated booklet giving a brief write-up of each important commercial species of fish.

Sardines were scarce at San Diego this past spring seriously interrupting the sampling records taken by the State Fisheries Laboratory as a basis for studies of age and rate of growth.

Two of the large canning corporations of southern California have made arrangements to import frozen Japanese albacore from Japan using a cold storage boat. A test run of two tons brought over resulted auspiciously.

Bureau of Education and Research.

Dr. H. C. Bryant, Director of the Bureau of Education and Research started his eighth season in charge of the Nature Guide Service in Yosemite on the 26th of May. This summer resort educational work has been highly successful, reaching thousands of vacationists when they are most interested in natural resources. A staff of eight men will be necessary to handle the crowds expected this year. The program includes lectures and field trips.

Evidence of an attempt by this bureau to forestall a loss to deer through the taking of fawns by uninformed persons is to be found in the following letter and nature lesson sent in quantity to every school superintendent and every game warden in the state:

Dear Friend of Conservation:

The Fish and Game Commission enlists your aid in solving one of its problems. In the late spring and summer months deer give birth to their fawns and it is at this time that the Fish and Game Commission receives numerous letters advising of the finding of baby fawns. It is in answer to these letters that we are issuing the enclosed nature lesson for your students. We also wish to stress here that it is a violation of the law to take these fawns and we trust that the facts cited in the lesson may help conserve this year's increase.

Sincerely,

H. C. Bryant,
In Charge,
Bureau of Education and Research,
California Fish and Game Commission.

A TIMELY NATURE LESSON.

In late spring and early summer deer leave their winter quarters and go into the higher mountains. The bucks whose antlers have started to grow again seek shelter along the higher ridges. The does hold to the mountain meadows and to the ridges near lakes and streams. Here on one of these brushy ridges the mother deer finds a secluded place and gives birth to twin fawns. For the first few days the young lie quietly in the shelter of a bush being dependent upon their protective coloration (a white-spotted, reddish brown coat blending with the ground) and lack of odor to escape detection. The mother leaves the fawn only when necessary to obtain food and water, never going far and always standing guard, alert to every motion or sound.

To these same fawning grounds come fishermen and mountain hikers, recreation bent. By chance they discover a fawn. Truly, it does seem lost and abandoned by its mother! It is thin and starved looking. It instinctively plays "possum" when touched, strengthening the theory that it is weakened by starvation. "Poor thing! Let's take it to camp and rear it on a bottle," is the usual comment. So the little creature is carried away while the helpless mother looks on from some concealed vantage point. Then come days of exacting care usually followed by the death and burial of the fawn.

To see a new born fawn is a rare privilege and one's appreciation is much more intelligently expressed by leaving it undisturbed. To carry it back to camp instead of leaving it to the care of its natural mother is to commit an act in violation of the law. Though summer vacationists may think they are performing an act of benevolence, they are in reality but kidnappers and rightly do they deserve all the derisive thought that goes with the name.

The Fish and Game Commission looks with disfavor on "fawn kidnappers." A letter directed to it for a permit to keep a fawn will be met with a rebuke. Very rarely do bottle-fed fawns live and because the Fish and Game Commission exists for the purpose of conserving the wild life of California, it can not give its sympathy to acts that so materially reduce the deer supply.

A teacher's bulletin which is a revision of a former one entitled "Bird Study in the Public Schools" is being prepared for publication. This bulletin was in great demand for several years and the supply has long since been exhausted. It has now been completely revised by the original author, Gretchen Libby, and a new annotated list of birds will be appended.

This is but a start on numerous publications of this kind that are contemplated.

Bureau of Hydraulics.

Oil pollution conditions in the southern California coastal district have improved in the past few months. The oil companies, on account of the warnings given them to clean up and keep cleaned up and to safeguard against spills, have been very good about trying to keep the oil from getting away from them. When one considers the amount of production, transportation and the number and capacity of refineries in this district, it is remarkable that there is so little oil getting away from the companies here. Most of the trouble comes from the smaller, independent stock companies who are operating here. They do not take the precautions that the older and larger companies do. Consequently it is necessary to follow up with warnings and inspection as new ones come into the field and some of the older ones become careless. Los Angeles is now the largest shipping point for oil in the world. All vessels loading or unloading cargo here take bunker oil. It is not only the largest shipping point, but oil is cheaper here than at any other point in the world. During the past year there were 122,915,528 barrels of oil (cargo oil) shipped out of this port; this besides that taken by ships going and coming for bunker oil, and by the fishing fleet of 750 fishing and tender boats which work out of this port.

Operations of the new oil reclamation pipe line and sump system of Oil Producers, Inc., an organization of big operators in the Signal Hill and Long Beach fields, began on March 29. Installation of this system was the result of the activities of the Bureau of Hydraulics toward the elimination of pollution in Long Beach harbor. Suits naming twenty-one of the largest operators in a complaint of violation of section 635, California Penal Code, were filed by the Commission.

More than $100,000 was expended in the laying of the pipe lines and installation of the sumps. The new sump system, covering over 15 acres of ground, is located at Flood Control Channel and Wilmington Road, Long Beach. The pipe lines leading to this point are more than 10 miles in length. A large dehydration plant will be erected alongside the sumps to care for all oil thus reclaimed. The system is calculated to care for all wastes of oil fields of that vicinity, extracting the oil and discharging only clear water into Long Beach Harbor. It is hoped thus to prevent the wholesale slaughter of fish in the harbor and streams flowing into same.

It will be many months before conditions in the Long Beach, Signal Hill, Los Cerritos and Huntington Beach fields will be normal, but the installation of this pipe line and sump system will do much toward bringing about better conditions.

The General Petroleum Company was recently convicted on a charge of wilfully and deliberately polluting the waters of the Ventura River. Superior Judge A. C. Henderson, before whom the case was tried, assessed a fine of $500, which was suspended for a period of six months, dependent upon future activities of the company. Ventura County officials have declared that another violation of this nature on the part of the company will meet with maximum penalties.

The General Petroleum Company was charged with cutting the walls of its sump along the banks of the Ventura River, and allowing a large amount of polluted water to escape into the river and harbor, with subsequent deleterious effect upon fish life.

A fine of $200 was assessed by Justice of the Peace John P. Gallagher to the Shell Oil Company for polluting the waters of Petaluma Creek. A barge captain in unloading the fuel oil at the Petaluma station allowed the oil to overflow. The oil was on the surface of the water and the banks of the creek for five miles were soaked. A crew of men were put to work to remedy the condition. This they accomplished in a very satisfactory manner.

Bureau of Public Relations.

Major Rolin G. Watkins, former director of the Bureau of Public Relations, resigned May 1. He has been succeeded by Frank H. Vore, an experienced newspaperman, former editor of the sporting page of the *Fresno Bee*.

Efforts to educate the public relative to an abuse which has been assuming sizable proportions in recent years—that of taking baby fawns home to raise on a bottle—led to the simultaneous broadcasting by four stations in one evening in early May of suitable information. The courtesy of these stations in helping in this regard will long be remembered.

The director of this bureau visited the State Game Farm and the main state hatchery at Mount Shasta City. These trips resulted in the releasing of a number of descriptive articles which received wide publication throughout the state.

The story outlining the Commission's plan of fish planting to be placed in operation this year and the plea for the help for fawns were the two that received the widest attention by California newspapers. All papers are giving this bureau wonderful cooperation.

The duties of the director include the establishing of valuable contacts through attendance at meetings, luncheons, conferences and the like where the message of conservation is carried many times to persons not acquainted with the program but willing to learn.

This in addition to the sending out of from four to seven stories weekly, based on the activities of the Commission from actual records and first hand information make this bureau an exceedingly busy one.

The first pheasant egg was gathered on March 8 and by the end of the month the production reached a hundred. The first setting of eggs hatched April 12. On May 6, a hatch of over 800 were moved to pens.

Several broods of ring-necked pheasants were exhibited at the Sportsmen's Show, May 14-22. We were all proud of this exhibit which consisted of eight pens, seven of pheasants and one of partridges.

Six mountain quail eggs were received from Deputy Groves. Eight sagehen eggs were received from Deputy Fisher. The successful hatching of these eggs constitutes the beginning of a series of experiments to determine what native game birds can be propagated on game farms.

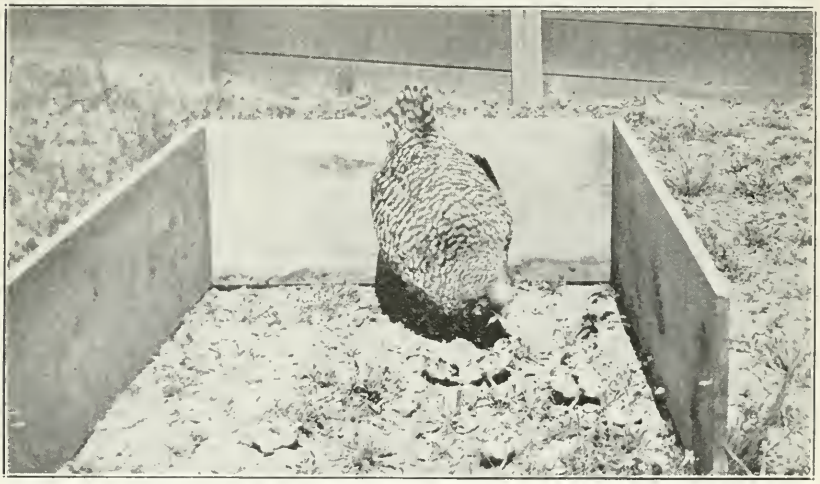


FIG. 47. A domestic hen with her brood of pheasant chicks. State Game Farm. Photograph by August Bade, April, 1927.

Bureau of Game Farms.

The breeding stock at the Yountville Game Farm at the beginning of the laying season this past spring included 600 ring-necked pheasants. They were from stock raised last year and were hand-picked. Thirty pair of valley quail and one of bob-white were saved as breeders also. In February, thirty pair of Hungarian partridges were purchased. Nine or ten pair soon showed that they were well mated.

March was a busy month at the game farm for all the pens were cultivated and planted so as to furnish food and cover for the young birds. Farm work is a necessary part of game propagation.

Bureau of Statistics and Game Problems.

The fur trapping report for 1925-1926 has been completed and both the total catch of furs and revenue received by the trappers show an increase over the previous season. The preparation of fur trapping data for 1926-27 is now in progress.

Laboratory facilities have been increased, thus making possible an enlarged scope of activity. Complete equipment for water analysis has been purchased, also additional equipment for bacteriological and pathological investigations have been secured. A temporary laboratory has been installed in the office and a new room is being prepared at the Hooper Foundation for Medical Research.

COMMERCIAL FISHERY NOTES.

N. B. Scofield, Editor.

CALIFORNIA'S FISHERY STATISTICS.

The system in effect in California of gathering fishery statistics was inaugurated in 1918 in southern California and later put into effect throughout the state under a statute passed by the legislature in 1919. This statute requires that all persons dealing in fish must use receipt books of a form adopted by the Fish and Game Commission, and it is unlawful to use any other form of receipt in the purchase of fish. We use three forms in California, known as the packers' receipt book, fresh fish dealers' book and trawler record.

The law requires that the white or first copy be given to the fisherman at the time fish are purchased. The yellow copy is retained in the book by the dealer or packer, and representatives of the Fish and Game Commission gather the pink or triplicate copies, which are brought to this office, or our branch offices at San Pedro and San Diego, where the records of the catch are compiled, showing the amount of fish received by each dealer.

After the records have served their purpose in this office, they are forwarded to the California State Fisheries Laboratory at Terminal Island, where they are segregated by boats and filed away for future reference of our biologists or investigators who might wish to work on any certain species of fish. With these records filed by boats, we are able to follow the boat catch right through the year, or for several years, and gain knowledge that it is practically impossible to secure in any other manner.

The receipt books are supplied by the Fish and Game Commission, the dealers' books costing us between twenty-five and thirty cents, while the packers' books and the trawler record books cost between twenty-two and twenty-five cents per book. Each dealer is furnished such books as he will require for several months' use, and a complete record is kept by our various offices. When the pink triplicate copies of tags are gathered up, the tags are checked in this office to see that no books are overlooked, misplaced or destroyed by the dealer. We have little difficulty of this sort. Occasionally a book has been burned or lost overboard, in which case we lose the record, but this only occurs on rare occasions, in case of accident.

Our greatest difficulty in California is control of fish buyers who operate on a small scale, particularly in Del Norte and Humboldt counties. That is, they work on the Klamath River during the salmon run there in July, August and the first five days of September, then go to Smith River and operate there during the open months of September, October and November, and are out of business the balance of the year.

They purchase their fish from fishermen and haul it to Eureka or into Oregon and we have had considerable difficulty in keeping tab on them, although at the present time we have them pretty well under control.

Our regular dealers are very glad to use these books, as they are saved the expense of furnishing their own receipt books, also the bother of making up reports for the Fish and Game Commission. The only improvement we might make on the system would be to have more men collecting the triplicate tags and calling on the dealers weekly or semi-monthly, which we can not do at the present time on account of the few available men for this work. At times we have to wait two or three months before we make the rounds of all the dealers, and in some cases we ask the dealers to mail the tags to this office, though we try to avoid this as much as possible.—S. H. Dado.

PEARL ESSENCE IN SAN PEDRO.

A plant for the manufacture of "pearl essence" from sardine fish scales, the first of its kind in California, has just been opened on Terminal Island, (East San Pedro), California, by the Dallas Pearl Essence Company. This new by-product of the great fishing industry is a liquid used in coating artificial pearls, the backs of combs, brushes and all kinds of dressing table sets. About three to four hundred pounds of scales in the moist form are necessary to make one barrel of scale water, which, in turn, produces about one pound of pearl essence marketable at from $60 to $200, depending on its quality. Mr. Davis, head of the company, has been working for almost three years on a method similar to that developed by the Technology Division of the U. S. Bureau of Fisheries for removing the pearl essence from scale water, and is now confident of a marketable product.

Pearl essence can be made from the scales of any kind of shiny fishes, but, of course, more profitably from some than from others. From the scales of fresh water shad is produced a particularly clear liquid which is worth $175 a pound. Salmon scales produce a very pure pink essence.

The scales are taken from sardines when the fish are delivered to the canneries. They should be obtained as fresh as possible, since, when they are allowed to stand, the proteins in the scales soon begin to ferment, with the formation of fatty acids. Oil and fat are very difficult to remove from the scale water,

and until they are removed, the product is not marketable; however, scales can be used as long as twelve hours after the fish have been caught. The ideal way to collect them would be to station gatherers on fishing boats to get absolutely fresh fish scales. They should also be obtained as clean as possible; the attempt is therefore made to get them from the scaler, which scales the fish directly from the weighing bucket before the head and viscera are removed. When they are obtained in this way, blood and remaining particles of viscera are not mixed in with the scales.

A screen is placed around the inside of a centrifugal tub in an apparatus similar to an electric washing machine. The scales are placed in this and agitated in water for about five or ten minutes. This process washes the lustrous substance from the scales and suspends it in the water, which is then drained off into a barrel. From the barrel the scale water is drained into five-gallon glass bottles until they are two-thirds full. About three quarts of pure ether are then put into the bottle and the whole is well shaken. The mixture of scale water and ether forms a colloidal liquid. Some pure pearl essence, which is of a very light gray color, soon collects on top of this mixture; while immediately below is a thicker dark layer of pearl essence and ether in a colloidal state, suspended in a dilute solution of water and ether. Below this is scale water, which constitutes three-fourths of the total, with a large percentage of the lustrous material removed. This solution is drained off and treated again as before to get all possible value from it. The upper two layers are treated with ether several times until all the water, oil, and other foreign substances are removed. The result is a pearly looking fluid. When this is agitated in a small bottle one sees very thin light blades floating in the liquid, and turning over like narrow strips of paper falling through the air.—Virgil G. Russell, January 28, 1927.

KEEPING SMALL SARDINES FIRM BY REFRIGERATION.

To keep sardines firm before and during cutting, the California Packing Corporation has installed a refrigeration system, the first to be operated at San Diego. It is used primarily for quarter-oil fish, which, being small, take considerable care and time to cut. Previous to the installation of freezing devices, they were often soft and broken at the end of the cutting process, and therefore would not make as uniform a pack as was desired. Waste was also very great. Now, however, sardines are kept at a temperature a little above the freezing point, and so remain firm throughout the cutting period. With refrigeration the sardines are always in a perfectly fresh state when cut.

Cooling is accomplished by indirect expansion apparatus, consisting of a compressor and a condenser of six tons capacity. Liquid ammonia is compressed to 150 pounds pressure per square inch, 175 pounds on the high side, and 125 on the low. Sudden liberation of the compressed liquid through a valve with a tiny orifice, into the coils of the brine bin, causes it to become gaseous. The gas absorbs heat from the brine, thus reducing its temperature. In the brine tank are 500 feet of $1\frac{1}{4}$ inch coils, and 2600 gallons of 90 per cent salt solution. To insure uniformity of temperature, the brine is kept in circulation by a centrifugal pump, which continually forces it from one corner of the bin to the farthest opposite corner.

After the ammonia gas has absorbed its maximum of heat, it is cooled by being run through a condenser. This has ammonia jackets outside and water coils inside. The same water which cools the condenser is used to cool the compressor, being sent through a cooling tower by the pump used to circulate the brine in the brine bin. The brine in the latter is cooled to about 0° F., and then pumped into the coils of the sardine tanks. There are four of these, each with a capacity of three tons of sardines, and containing 150 feet of $1\frac{1}{4}$ inch brine coils. Circulation of the brine in the coils of the four tanks by the operation of a centrifugal pump, reduces its temperature to 36°-40° F. The fish are held for cutting in the sardine tanks, and, the tanks being above the cutting tables, are let out through gates in the bottom of these, to be cut in the usual manner.

The brine bin and sardine tanks have double walls, the space between being filled with wood shavings. Their tops are made as air tight as possible, in order to insulate them against the temperature of the surrounding air. It takes about fourteen hours to cool the brine from atmospheric temperature to 0° F., and two and one-half to three hours for the brine after it has reached this temperature to go through the sardine tanks. The refrigeration process is controlled by a thermostat, so that when the brine reaches 0° F., the compressor stops, and when it rises above this temperature, begins to operate. The pumps, however, are not automatic.

Although this system will maintain the prime condition of the fish as received from the boats, it can not, of course, restore sardines already broken or damaged to their original quality.—S. S. Whitehead, California State Fisheries Laboratory.

A TRIAL SHIPMENT OF FISH FROM THE ATLANTIC COAST.

During the second week of April of 1927, the Van Camp Fish Market of San Pedro received a small shipment of fish on consignment from the Atlantic coast. The shipment consisted of the American fresh water

eel (*Anquilla chrysypa*) and the harvest fish (*Rhombus triacanthus*).

This was of particular interest, since the American fresh water eel is not found on the Pacific coast, but only on the Atlantic. The fresh water eel is considered an excellent pan fish in eastern United States, and is of some commercial importance. Also the harvest fish is related to the California pompano. If there is a demand for these Eastern fish, no doubt other shipments will be made.—C. R. Jackson.

A NEW TUNA BOAT.

It will be noted from the January, 1927, number of the Pacific Fisherman that there was unusual activity in construction of fishing vessels along the Pacific coast during 1926. Progress in design, power, and improved equipment is being made at the same time. An example of this activity and progress is seen in the building of the tuna boat, *Lusitania*, which is now nearing completion at San Pedro. It is being built for Joe Rose by the Larson Boat Company.

The *Lusitania* has a cruising distance of 4000 miles, a possible speed of 13 or 14 knots, and a crew of 8 men and 2 officers. The net tonnage is 74, and it has a carrying capacity of 200 tons. The main power plant is a 300 horsepower Western Enterprise Diesel engine. There are two auxiliary engines for running the pumps and generators. The boat measures 101 feet in length, 24 feet in width, and 7 feet in draft. There are two large fish-holds forward and aft, which are lined with cork. The two live bait tanks are 12′ x 12′ and 13′ x 14′. The water to the bait tanks is supplied by two 4-inch pumps. The inflow to the tanks is so arranged that the water is well aerated. There is also a mechanical anchor winch forward, an air compressor and a generator.

New features of equipment embody elaborate provision for comfort, as well as many interesting innovations for efficiency and ease of operation. The crew's quarters are above deck. The galley is aft. The wheel room, chart room, the captain's and mate's staterooms, and the chapel are on the upper deck. These rooms are finished in mahogany.—Carl R. Jackson.

THE SARDINE INDUSTRY.

Even those who live near at hand fail to realize the magnitude of the fishing industries of California. Though the average person may know that sardine canneries exist in California, few realize the size of the pack or the extent of foreign trade. The following excerpts from an article entitled "Oriental Markets," under the authorship of Captain Robert Dollar, well-known shipping man, which appeared in the *Outlook* for May 4, 1927, gives a vivid picture of the export trade in sardines.

"Back of this widespread demand for sardines is a story which typifies what foresight and initiative on the part of an export official connected with one of the fish-canning companies did in bringing about the sale of fish in countries where fish were already bountifully available at prices so small that they can scarcely be calculated in American money.

"Twenty-five years ago this official made a trip to the Far East. In those days such a journey was considered only from the sightseeing angle by manufacturers. Undoubtedly, this man's family, friends, and business associates thought his mind was weakening when he set out for Japan, China and the Philippines with the idea of developing trade for canned goods. Americans at that time knew very little about canned food, and Orientals knew very little about anything that concerned America. This man realized that it would not be feasible for him to force his product immediately on a class of people who had been accustomed to ordering their lives in the same groove for the past thousand years or more. This, however, did not prevent him from personally distributing cans of sardines in native bazaars; anything but a pleasant task, I can assure you, for the smells, yells, and general confusion in the narrow streets and shops that were no bigger than stalls proved a serious handicap when combined with the fact that all business had to be transacted through an interpreter.

"By the time this man had visited bazaars in Japan and China he was pretty well played out and very glad to reach the Philippines. His early enthusiasm had waned, and after a more or less casual interview with an import-and-export firm in Manila he decided to return as quickly as possible to America. Out of his original consignment of sardines four cases remained. These he turned over to the manager of the Manila firm, with the suggestion that they could be distributed in any manner the local representative saw fit.

"A considerable time passed. The canning official returned to America, and was again immersed in the problems incident to the furthering of the sale of his product. A few orders from China and Japan served to reward him in a slight degree for his valiant efforts to introduce canned fish to those countries. One day a letter arrived from Manila requesting the shipment of a hundred and forty-four cases to Singapore. Much as the cannery man prided himself on his knowledge of the Far East, he had to hurriedly consult an atlas to find out just where Singapore was located—remember that was a quarter of a century ago.

"Well, that was the beginning. Year by year the sardine business grew, so that now this same official has but one complaint—he can not average a large enough pack each

year to satisfy the demands. And do not for a moment think that his company has a monopoly on the export of sardines. There are many canneries located along the Pacific coast; Monterey, some eighty miles below San Francisco, is the community where the greatest percentage of fish are caught and packed each season. San Pedro, which adjoins Los Angeles Harbor, also boasts of many factories. The season is from July until mid-March at Monterey, and from November until March at San Pedro. The fish are quite large, are akin to a smelt in size, and for this reason ideal for export.

"There is no need to dwell on the added prosperity this great canning industry has brought to California. An export business of over eleven million dollars a year, which, by the way, constitutes eighty per cent of the entire pack, speaks for itself.

"It seems to me that the manner in which these fish are distributed should be of especial interest; it emphasizes the old, old story, that mass production and mass distribution —no matter how small the retail price of the article may be—is the surest means of building up a successful enterprise.

"The packers ship the fish in wooden cases which each contains forty-eight cans. Oftentimes a single transpacific shipment will amount to over a hundred thousand cases, all of which are destined for the countries of the Orient which lie south of the Philippines, for, strange as it may seem, Japan and China have never acquired a marked liking for sardines. Into the ports of Singapore; Pontianak, Borneo; Batavia, Java; Rangoon, Burma; Colombo, Ceylon; and Calcutta, India, goes a portion of each large shipment. Various export houses in these cities take consignments ranging from ten thousand cases down to as few as fifty. Instead of jobbers, each firm has agents in the more remote inland cities and towns. These agents send in orders for ten, fifty, a hundred cases, as few as a dozen tins, and, in the very small villages, one tin. The majority of stores where the sardines are placed on sale are, to our Western eyes, little more than bamboo-matting huts, which huddle by a jungle roadside or front on some swiftly flowing tropical torrent. To these shops go natives in bright colored garments—Malays, Malay-Chinese, Burmese, Tamils, the Hindus and Mohammedans of a hundred and more races of India; not the coolies, mind you, for coolies live mainly on raw grains and occasionally rice curry; these people who go to buy are the legion of the lower middle class—tailors, cooks, house boys, farmers, metal workers, and a thousand other types of workers. Rarely, if ever, do they buy more than a single fish! Not a single can—a single fish! Sometimes they bargain for half, or a quarter of the delicacy, according to their affluence. On a large wet leaf, they accept the food of their choosing after it has been covered with a carefully measured amount of tomato sauce. A minute copper piece joins other minute copper pieces in the shopkeeper's tin money box, and up the road strolls the contented purchaser, his eyes asparkle with the feast he is balancing on his upturned palm.

"In the cities better-class natives, such as merchants, office workers, brokers of jute, tea, and rice, go to their favorite shops in the bazaar districts and order a can of sardines, then collect a number of their friends and indulge in an impromptu banquet.

"So it goes. And all because a man had four unwanted cases of sardines in Manila twenty-five years ago. Those four cases at current market figures were then worth something in the neighborhood of twenty dollars—surely a small investment for the founding of such a vast export business.

"There are some people who will say that the growth of the sardine business was a matter of luck. I contend such is not the case—any more so than the success with which half a hundred other American products have met with in the countries of the Far East. It must be borne in mind, however, that this business has come gradually during the past twenty-five years, in the face of terrific competition. Yet once the natives were convinced that the taste of American sardines was superior to any other fish they had ever eaten, they promptly vetoed their home-caught variety.

"This is but another instance of the importance of personal contact in foreign trade. Years of experience in doing my best to promote foreign trade prove that the yearly visits I make to various world centers where I call upon business men who have interests kindred to mine, have done more than anything else to bring to pass the culmination of many of my ideals. And surely, if I, a man with more than fourscore birthdays to my credit, can still exert this amount of energy in behalf of my business, a few younger men can do likewise, with the same results."

LIFE HISTORY NOTES.

A CALIFORNIA BADGER.

I had for years tramped the fir forests and manzanita-covered ridges of the Feather River country, yet my acquaintance with the badger had been limited to glimpses of his tracks in the dust on a very few occasions. So it was that when I rounded a turn in the Forest Service trail one summer morning, and came abruptly upon *Taxidea* in person, I experienced no little satisfaction at having my camera with me.

I found him busily engaged in disinterring the putrid remains of a rattlesnake which I had buried some time before—and was more or less shocked to see him devour the unfragrant reptile as if such things were a common article of his diet. I was near enough to observe that after he had given the snake's head a crunch or two, however, he spat it out as if its taste were not up to his required standard.

When he had finished the rattler and moved out into an open space, I snapped his picture and endeavored to remain as inconspicuous as possible, hoping that he might give me another opportunity. I was partly hidden from his view, but made a slight noise while changing the film, and he turned sideways to listen, standing bow-legged while I took the next photo. Then, catching the slight movement of my winding the film he backed under a fringe of scrub-oak and peered up at me intently as I snapped him again. His patience was apparently exhausted after this photo, and he slipped away into the underbrush with considerable agility. I hastily emerged from my scanty concealment to see him running down an open glade with his rapid, shuffling gait, the long hair on his sides standing out stiffly so that from a distance it appeared for all the world like the shell of a turtle.

Three days later I found his furry body lying beside the trail—shot by a villager and tossed aside, a token of the disregard with which mankind tends to view all forms of life save that of his own sacred species.—W. I. Follett, Oakland, California.

FIG. 48. A California badger at home. Feather River Canyon. Photographed by W. I. Follett.

THE RATFISH OR ELEPHANT FISH.

Hydrolagus colliei.

The recent capture, by hook and line, of a ratfish or elephant fish at one of the piers in San Francisco Bay by M. W. Moon, of San Francisco, excited great interest among the local fishermen, who had never seen anything like it. It is a rare fish in the bay, but it is plentiful off southeastern Alaska, its range extending from Monterey northward, where it dwells in cold water at moderate depth, in the north coming frequently near the surface. Its living relatives, which are few, are deep-sea forms.

The newspaper reports, which compared its different parts to different animals were

not far out of the way, for the family to which it belongs, the Chimaeridae and the genus in which itself was once placed, Chimaera was named after a mythical monster of Greek mythology which had the head of a lion, the body of a goat and the tail of a serpent. The generic name which it now bears, Hydrolagus is Greek for water-hare, in allusion to the form of the lips and teeth. Its specific name is for Mr. Collie, the naturalist who first found it at Monterey.

The subclass to which the Chimaeridae or spook-fishes belong is a very ancient one, and what few are now living are survivors of a once extensive group, now represented by fossils. They are generalized types and show relationship to the sharks, the ganoid fishes (sturgeons and garpikes) and the batrachians or group containing the frogs and salamanders. It is a characteristic of generalized forms that they possess traits of both lower and higher groups. Thus the sharks, while their bodily structures, such as cartilaginous skeletons, etc., are lower than those of the bony fishes are, in their methods of reproduction, related to the higher groups, the ova being fertilized internally, and the young either being born alive or produced in eggs with leathery shells. The young, moreover, have external temporary gills like those of the salamanders.

Little is known of the reproduction of the spook-fishes, to which the rat fish belongs, but certain accessory organs indicate that it is like that of the sharks. It is these accessory organs which add to the peculiar physiognomy of the fish and which appear to be misinterpreted in the newspaper accounts.

Attached to the forehead of the rat fish caught is a peculiar knobbed organ beset with prickles; it is known as the frontal clasper, and is a secondary sexual character possessed only by the males. The newspaper account of it as a "breathing" organ was incorrect, possibly misprint for "breeding."

The newspaper accounts also spoke of its having four legs. This reference was to the claspers, forked bodies also beset with briar-like prickles and projecting from near the base of the ventral fins. These are also secondary sexual characters, belonging only to the male.

The probable use of the claspers is suggested by the account of the group given in the Cambridge Natural History: "In its breeding habits, and in the mode in which its eggs are fertilized, Chimaera (including Hydrolagus) probably resembles the oviparous sharks and dogfishes, the eggs appear to be deposited on the sea bottom." Of the breeding of sharks the same volume remarks: "Unlike the generality of fishes, the eggs are fertilized internally as a sequel to the copulation of the sexes. For this purpose the males are furnished with intromittent organs. The Myxopterygia or so-called claspers which are developed as modifications of the hinder portions of the pelvic fins * * * . When sexual congress takes place the claspers are thrust the cloaca of the female into the oviducal orifices, and in some instances it is probable that they are retained in this position by hook-like tenticles developed at their free extremities. The seminal fluid then flows along these conduits (description of the anatomy omitted in this quotation) into the ovaducts, in the upper portion of which meets and impregnates the eggs. After fertilization the egg is enclosed in a dark brown, horny egg-case."

The egg of the different Chimaeras known are enclosed in horny egg cases, some with a long peg-like end where they are probably implanted in ooze, others are covered with silky filaments more or less closely resembling cocoons. Little seems to be definitely known about the eggs of the species under discussion. Dr. Jordan in his book on fishes says that they are fertilized after extrusion. In this case the claspers, described in newspaper accounts as legs, would no longer be functional but there is no doubt about their original purpose.—H. Walton Clark, California Academy of Sciences, San Francisco, California.

DOVES WINTER IN SISKIYOU COUNTY.

Most mourning doves are summer visitants in California but occasionally individuals may be found in winter even in the northern part of the state. About four miles southwest of Yreka, Siskiyou County, along a range of mountains lies a basin of low ground, warm and sheltered. Mullen and an abundance of grasses grow there making feed plentiful and bunches of juniper along one side afford suitable roosting places. Here while on a patrol trip on December 18, 1926, I found about twenty or twenty-five doves. On January 5, I visited their feeding ground and counted eighteen birds. Again on January 16, I saw the birds but they were scattered and I did not count them. On March 10, I saw them again and counted seventeen, but may have missed one. By the middle of April, they had scattered and part of them were feeding in the Oberlin Fort hills. In former years, I have noticed doves in this same place and believe that they winter there. Irregularly old timers here tell me they often winter in this place.—Wm. Lippincott, Yreka, California.

EASTERN CRAYFISH IN SAN DIEGO COUNTY.

On August 13, 1926, six adult specimens of crayfish were taken in a pool in the Escondido River in the northern part of San Diego County. These were turned over to the O'Rourke Zoological Institute of San Diego

and eventually two of them were identified by Dr. Wm. P. Hay at the U. S. National Museum as *Cambarus blandingii acutus* Girard. This is an eastern species ranging from Wisconsin to Louisiana and east to South Carolina. It is presumed that the introduction was made through the medium of a shipment of crayfish made to a local school from an eastern biological laboratory.

Since that date several other specimens have been taken until a total of 15 or more are known. This would seem to indicate that the species is firmly established.—Frank F. Gander.

POSSIBLE DISEASE IN MOUNTAIN SHEEP.

Supplementing the article suggesting disease as being responsible for the death of mountain sheep which appeared in the January number of CALIFORNIA FISH AND GAME, I wish to record the following information:

On February 5th, I took a trip into Deep Canyon near Indian Wells. I saw tracks of a sheep near the entrance to the deep gulch and followed them a considerable distance. Suddenly I came upon the carcass of a female. I could see no evidence of violence practiced by hunters. The pelt was whole and there were no signs of wounds. The animal seemed much emaciated and from the nostrils had come a great supply of mucus which made a puddle in the sand in front of the animal's mouth. It looked as though the animal had not been dead over a few hours. At the time I supposed that death had come as a result of pneumonia, but I have no proof other than the mucus sign.—Edmund Jaeger, Riverside, California.

THE EASTERN BULLFROG IN SOUTHERN CALIFORNIA.

In CALIFORNIA FISH AND GAME (Vol. 8, No. 4, pp. 219-224) there appeared an article on the eastern bullfrog in California closing with a statement to the effect that it would be desirable to record other cases of introduction and acclimatization. The following note concerns the presence of the eastern bullfrog in southern California.

The first I noticed were at Pet. Phylanx reservoir three or four miles west of Loma Linda and near the Santa Ana River. They were of good size, for I caught some. Two years ago I noticed a few at the Los Serranos Country Club, which is about three miles southwest of Chino. Last year there were a great many there. This place is ideal, for there is a small lake or reservoir stocked with black bass, and this is supplied with fresh, clear running water and surrounded by tules and moss. About three weeks ago some six or seven miles south of Chino on a small stream, a tributary to the Santa Ana River, I found several, do not know how many, but saw six large ones at one deep pool.

These small streams are clear and full of chubs, sticklebacks and freshwater shrimps, but no large fish. These frogs have evidently followed down the Santa Ana and back up the small streams.—F. A. George, Pomona, California.

CONSERVATION IN OTHER STATES.

A NEW REFUGE FOR ILLINOIS.

Nine thousand acres of Illinois River bottomland were saved for the sportsmen of Illinois by the purchase, on April 19th, of a game preserve and public hunting and fishing grounds in Woodford County, across the Illinois River from Peoria. Deeds conveying seventeen hundred acres of land and water to the state of Illinois were accepted on that date by Governor Small and William J. Stratton, director of the Department of Conservation. The purchase of this preserve and shooting and fishing grounds located in the heart of the Rome View Drainage and Levee District caused the dissolution of the district. According to Director Stratton, there can be no reorganization of this district, so that the amount of hunting and fishing grounds actually saved for the people of Illinois by this purchase is close to nine thousand acres. The establishment of forest, game and fish preserves and public hunting and fishing grounds is one of the important phases of the game and fish restoration program now being carried out by the Department of Conservation.—*The American Field*, April 23, 1927.

GRAYLING NEARLY EXTINCT IN MICHIGAN.

Since 1919 the taking of grayling has been prohibited. The introduction of a bill in the legislature during the session of 1925 served only to attract attention to the fact that this fine fish, now extinct except for a single stream in the Upper Peninsula, is in imminent danger of being entirely exterminated. Fortunately the bill failed of enactment. In September, 1925, an expedition was sent to the Otter River to transfer a number of these fish to lower Michigan in an attempt to re-establish them. The mission of effecting the collection and transfer of these fish was most successful, one hundred specimens in various stage of maturity being planted in a tributary of the Tittabawassee on the state game refuge in Gladwin County, where a small dam and screen were installed to prevent the migration of these fish down stream. Twenty-two grayling were also

delivered to the Grayling Fish Hatchery. Ample protection is afforded them at both locations and it remains to be seen whether the species will propagate in their new environments.

The history of grayling in Michigan reads like fiction. Once so numerous that men not yet old recall instances where they almost choked streams during their migrations, and inhabiting nearly all of the rivers and their tributaries in the northern part of lower Michigan, they gradually but surely disappeared from every stream in this region. Efforts to propagate the grayling at hatcheries met only with failure. Sportsmen familiar with them hold varying views to account for their disappearance, to all of which exceptions can be noted that would disprove these views. Some one has named them the "trout of the pines" and it is literally true that, like the pines, the grayling have succumbed before the advance of civilization.

In a further attempt to re-establish these fish one million of Montana grayling eggs secured from wild fish were shipped to Michigan in June, 1926, through the courtesy of the Montana Fish and Game Commission. The fry were planted shortly after hatching. —Biennial Rpt., Dept. of Conservation, Michigan, 1925-1926, p. 101.

IDAHO FURNISHES SALT FOR DEER.

The use of large quantities of sulphurized salt in big game habitats is an established practice, natural salt licks are becoming scarce through continuous use or made unavailable because of highway extension. It is a notable fact that animals dying from scurvy or tick infection in areas has been eliminated by the use of salt, which keeps the deer and elk in the best of physical condition; a phenomenal increase in numbers has also been noted since the distribution of salt has been taken up.—Eleventh Biennial Report of Fish and Game Warden of the State of Idaho, 1925-26, p. 9.

IDAHO'S GAME REFUGES.

Idaho is reputed to have set aside 3,000,000 acres of game preserves and refuges. This figure is approximately correct when the preserves set aside by statute are added to those created for specific terms under proclamation by the State Game Warden. This area may seem to be disproportionate to the needs of the state but it must be remembered that virtually all of these lands lie within the national forests and are neither privately owned nor subject to location under federal law and therefore merely open ranges, and are therefore not restricting the use of the lands even for grazing purposes. The areas embraced are with but one or two exceptions highly beneficial to the conservation of big game and in no wise defeat the hunter since all the areas within the national forests are surrounded with hunting grounds of equal or better opportunity during the open seasons.

Four new game preserves were created at the last session of the legislature, namely: Soldier Mountain, Warm Springs Creek, an addition to the Selway, and the Middle Fork Preserves on the Little Salmon River.—Eleventh Bienn. Rpt. Fish and Game Warden State of Idaho, 1925-1926, pp. 33-35.

PHEASANTS INCREASING IN NEBRASKA.

The Bureau of Game and Fish of Nebraska has recently secured a large number of special reports from citizens in all parts of the state on the pheasant, the information being furnished in response to a request from the department. Information was requested as to young birds seen last season in territory where stocking had been done. These reports were gratifying, a large majority having seen broods of young birds. Results of observation as to the food of pheasants were that the following kinds of food were taken, chiefly, in the order named as to frequency and quantity: Insects, waste grain, grain, weed seed, and garden truck. These reports confirmed conclusions from investigations made elsewhere, that insects constitute the favorite food of pheasants when they can be obtained. Grain, and any green stuff they can obtain, is included in the winter diet when insects are not to be had. One question asked was: "Do you consider the pheasant the farmer's friend or enemy?" Nearly 94 per cent of the answers were that the pheasants should be classed as beneficial to the farmer. Many replies referred to the work of the pheasants in cleaning out alfalfa fields, corn fields, gardens, orchards, etc., of grasshoppers. Another point on which information was requested was as to the reputation of the pheasant for pugnacity. Reports were general that the cock pheasant was a scrappy bird, but nearly all those having actually seen the pheasant in combat reported that its adversary was another pheasant or a domestic rooster. Few had seen any evidence of serious disagreement with other game birds.—*The American Field*, April 16, 1927.

THE BRITISH WILD BIRDS PROTECTION BILL.

The Wild Birds Protection Bill which has had the support of the Royal Society for the Protection of Birds has failed passage for the third time. In 1923, it was introduced in the House of Lords by Viscount Grey of Fallodon and passed all the stages in that house, but owing to the change of government, it was shelved. In 1925, it was introduced in the House of Commons by the House Secretary but secured no more than

a first reading, being withdrawn in December owing to the pressure of parliamentary business. In 1926, it was introduced in the House of Lords by Lord Desborough and was passed with but few amendments. It got as far as a first reading in the lower house on the 28th of July but made no progress in the autumn session. Oftentimes, it takes endless patience to secure proper constructive legislation. Conservationists in England will not let the matter drop until better protection is given the birds of the British Isles.

ARKANSAS INTRODUCES BEAVER.

Through the courtesy of Commissioner D. H. Madsen of Utah, four beaver were obtained and planted in Big Lake near Rottaken Spur. Beaver formerly inhabited Arkansas in great numbers, and it is hoped to bring them back in suitable areas.—Sixth Biennial Report, Arkansas Game and Fish Commission.

THE ASSOCIATED COMMITTEES FOR WILD LIFE CONSERVATION IN NEW ENGLAND.

With the formation of the Associated Committees for Wild Life Conservation, made up of representatives from the Massachusetts Audubon Society, the Massachusetts Fish and Game Protective Association, and the Federation of the Bird Clubs of New England, Inc., a real step has been taken in the direction of combining the efforts of these important organizations in such conservation matters as are of common interest to all three. It has been felt for some time by those who have favored this constructive step that much duplication of effort could be avoided, stronger appeals could be made and greater results could be obtained by joint action. This committee will undertake only such conservation work as can be better done by the combined efforts of the three component organizations than by any one of them or by all three acting independently.

It should be distinctly understood that each constituent organization will continue its separate identity and work on the special matters which interest it alone.

The associated committees will from time to time make joint appeals for particular objects so that patrons of the parent organization can support their activities without the confusion which is often caused by a number of appeals from different sources for the same proposition. It should be stated that all funds raised, with the exception of those devoted to the actual expense of carrying on the work, will be employed as stated in the appeals. No compensation whatever is paid to any member of the associated committees.

The associated committees are unanimous in urging:

1. That laws protecting song, insectivorous and game birds must be kept impartially enforced.

2. That reservations and sanctuaries are needed in which all wild life may live undisturbed.

3. That all enemies of our wild life must be kept under control and that the game birds so far as possible should be propagated to increase the number, or at least to fill the places of those taken.

4. That, for economic, educational and recreational reasons, the commonwealth should provide funds from the general tax levy to purchase, maintain, and administer throughout the state suitable breeding, nesting and feeding areas for birds and animals.

5. That if future generations are to enjoy those things which delight the lover of the out-of-doors, be he sportsman or bird lover, the work of conservation must be carried on actively to insure this heritage.

IDAHO'S OPEN SEASON.

Idaho is the only state in the Union which at the present time declares an open season on mountain goat. Over three thousand of these animals are now in the mountains and since their value is for trophies there is little likelihood that they will ever be reduced to a number demanding a closed season. Very few are reported as killed each year and recently checked census show an increase under the present open season.

While the federal authorities report an increase of appoximately sixteen per cent in the number of moose, our own figures compiled by deputy wardens show a much larger number of the valuable game animals in our forests. At present no open season is permitted on moose in Idaho and should not be made until the number increases very materially. No disease has been found among moose and there is every reason to believe that they will, under proper supervision, show marked increase in numbers during the next few years.

Elk in Idaho are rapidly gaining in numbers; their range is very wide throughout the state. Federal and state estimates each show remarkable increases and, while Idaho is one of the three states left in the Union which permits an open season on this animal, there is no reason for closing the season here. Approximately 350 elk are killed each year and the annual increase is conservatively estimated at over 500 per year under ordinary weather conditions. At least 6,000 elk are now in the state and a material increase in numbers would seriously endanger their existence because of limited winter range. The largest herds are found in central Idaho on the Salmon River drainages.—Eleventh Bienn. Rpt. Fish and Game Warden of the State of Idaho, 1925-1926, pp. 26-27.

ELK BROUGHT BACK TO OLD HAUNTS IN BLUE RIVER COUNTRY, ARIZONA.

The Blue River country of Arizona, where forty years ago thousands of elk ranged the hills, will once more be the home of a herd of these handsome American big game animals.

The Arizona State Game Department and the Forest Service and Biological Survey of the United States Department of Agriculture and local interests, have just placed a herd of 23 elk on the Blue Range game refuge in the Apache National Forest.

At one time the Blue River country harbored thousands of elk, deer and wild turkeys, and early settlers tell of bringing back six-mule-team wagons loaded with elk killed for holiday feasts. With the entry of the cattlemen and settlers in the country around the headwaters of the Blue and Little Colorado rivers in the early eighties, however, the big game began to disappear. Since the regulation of the ranges was put into effect by the Forest Service, the deer and turkey have come back to some extent, but the last elk was killed in this region, near Mount Ord in 1898.

Although the Indians and settlers did some hunting in the Blue Range, it is believed the depletion of the ranges by dense stocking with cattle was the principal cause of the extermination of the elk.

Before the new herd was turned loose on the Blue Range, the very few local settlers were apprised of the possibility that the elk might do some damage to farm crops in the vicinity should they multiply rapidly, but there was practically no opposition to placing them there. The farmers were enthusiastically in favor of it, and when the elk actually arrived there was a great deal of interest evinced by the local population. Sportsmen in the vicinity contributed toward the cost of establishing the herd. It is expected the elk will again become sufficiently numerous there to furnish a certain amount of hunting each fall to remove the surplus.

The elk liberated in the Blue Range were brought from the Yellowstone National Park. When they were liberated, each one had to be dragged out of the truck with ropes, but once in the open again, they left at a run for the high points on either side of the canyon, appearing little the worse for the trip. There were turned loose seventeen grown cows, two yearling heifers, one two-year-old and three yearling bulls.

The Blue Range refuge comprises one of the largest remaining wildernesses in the Southwest, where, it is thought, crop damage by the elk will remain at a minimum. It is rough country, almost uninhabited, and the newly established herd is expected to thrive.

NEW BIRD REFUGE AND FUR PRESERVE IN ALASKA.

President Coolidge, by recent executive order, has set aside certain areas along the Alaska Railroad as a preserve and breeding ground for muskrats and beavers, and a tract of 14 square miles about the government hotel at Curry, Alaska, which is also on the railroad, as a refuge for the protection of wild birds and game and fur-bearing animals. In the area at Curry fishing will be regulated by the Secretary of Commerce; and the hunting and trapping of birds and game and fur-bearing animals, other than brown and grizzly bears, wolves, and wolverines, will be permitted only under regulations to be prescribed by the Secretary of Agriculture, in accordance with the Alaska game law.

The muskrat and beaver preserve along the Alaska Railroad consists of eight tracts aggregating six square miles, four entirely on the west side, two on the east, and two on both sides, all of them one to two miles long and extending half a mile from the center line. Trapping or otherwise killing these fur animals on the preserve is unlawful except under rules and regulations to be prescribed by the Secretary of Agriculture, but the taking of such other animals and birds there as is permitted under the Alaska game law is not restricted by the new order.

The beavers have been active in building dams in the vicinity of the hotel at Curry, and these have proved attractive to visitors and tourists. Because of their accessibility, these places have been attractive also to trappers, who had started killing both beavers and muskrats for their pelts. The executive order was issued to prevent the extermination of the fur animals along the line of the railroad.

NEW BIRD REFUGE CREATED ALONG SAVANNAH RIVER, S. C.

President Coolidge, by a recent executive order, has set aside a tract of about 2350 acres in Jasper County, S. C., as a preserve and breeding ground for native birds. The area embraces certain abandoned rice lands belonging to the United States abutting on the Savannah River, near Savannah, Ga., and is to be known as the Savannah River Bird Refuge.

The new reservation has been placed under the administration of the Biological Survey of the United States Department of Agriculture. It will be unlawful for any person to hunt, trap, capture, disturb, or kill any bird or wild animal of any kind whatever, or take or destroy the eggs of any such bird, or to injure, molest, or destroy any property of the United States within the limits of the reserve, except under such rules and regulations as may be prescribed by the Secretary of Agriculture.

REPORTS.

VIOLATIONS OF FISH AND GAME LAWS.

FISH CASES.

January, February and March, 1927.

	Number arrests	Fines imposed	Jail sentences (days)
Violations of Angling License Act	8	$200 00	
Violations of Commercial Fishing License Act	5	55 00	30
Trout: closed season	10	585 00	
Trout: spearing in District 3	1	25 00	
Striped bass: over limit	9	745 00	
Halibut: undersized	1	25 00	
Black bass: closed season	6	160 00	
Catfish: undersized for sale	3	60 00	
Sunfish: closed season	6	155 00	
Eels: salt water, undersized	1	20 00	
Crabs: undersized	6	125 00	20
Crab: sale of meat out of shell	1	25 00	
Clams: undersized or over limit	26	855 00	25
Abalones: undersized or over limit	53	1,225 00	
Abalones: closed district or season	15	450 00	
Lobsters: undersized or oversized	6	295 00	
Illegal night fishing	3	130 00	
Nets, traps, lines: Illegal possession or use	8	300 00	85
Totals	168	$5,435 00	160

GAME CASES.

January, February and March, 1927.

	Number arrests	Fines imposed	Jail sentences (days)
Violations of Hunting License Act	28	$570 00	30
Deer: closed season	16	800 00	
Deer: evidence of sex removed from hide	2	50 00	
Ducks: over limit	4	125 00	180
Ducks: sale of	2	50 00	
Ducks: closed season	3	75 00	180
Doves: closed season	2	50 00	
Wild pigeons: closed season	5	225 00	
Quail: closed season	12	400 00	100
Pheasants: closed season	3	235 00	
Rabbits (cottontail and brush): closed season	28	720 00	25
Non-game birds: killing and possession	34	1,290 00	
Bird nets, traps: illegal possession or use	2	75 00	
Trespass	1	25 00	
Shooting game from power boat	8	250 00	
Night hunting	18	475 00	275
Guns: possession of illegal	2	125 00	
Fur trapping regulations	1	25 00	
Totals	171	$5,565 00	790

SEIZURES OF FISH AND GAME.

January, February and March, 1927.

Pheasant	2
Quail	12
Doves	2
Pigeon	18
Ducks	573
Geese	65
Non-game birds	149
Rabbits	60
Deer meat, pounds	410
Abalones	2,625
Pismo clams	561
Crabs	437
Lobsters, pounds	1,257
Striped bass, pounds	788
Herring, pounds	560
Halibut, pounds	196
Trout	189
Black bass	15
Catfish	6
Sunfish	77
Bird nets	3

STATEMENT OF INCOME.

For the Period January 1, 1927, to March 31, 1927, of the Seventy-eighth Fiscal Year.

	Detail	Total
License sales:		
Angling	$37,782 50	
Hunting	61,125 00	
Market fishermen's	5,040 00	
Trapping	888 00	
Wholesale fish packers' and shell fish dealers'	75 00	
Game breeders'	335 00	
Fish breeders'	145 00	
Total license sales		$105,390 50
Other income:		
Court fines	$13,913 38	
Fish packers' tax	27,544 05	
Fish tag sales	1,415 09	
Game tag sales	11 43	
Miscellaneous sales	15 00	
Interest on bank deposits	364 65	
Kelp tax	1 15	
Crawfish inspection	31 50	
Total other income		$43,296 25
Total income		$148,686 75

STATEMENT OF EXPENDITURES.

For the Period January 1, 1927, to March 31, 1927, of the Seventy-eighth Fiscal Year.

Function	Materials and Supplies	Salaries and Wages	Service and Expense	Property and Equipment	Total
Administration:					
Executive and legal		$3,630 00	$467 89	$613 96	$4,711 85
Clerical and office	$290 61	4,570 00	603 52	536 98	6,001 11
Rent			2,471 24		2,471 24
Telephone and telegraph			885 80		885 80
Postage			746 16		746 16
Freight, cartage and express			241 13		241 13
Printing	513 45				513 45
Automobiles	87 74		16 80		104 54
Accident and death claims			83		83
Total administration	$891 80	$8,200 00	$5,433 37	$1,150 94	$15,676 11
Education and research:					
Director and assistants	$38 37	$1,720 16	$146 43	$389 14	$2,294 10
Publicity:					
Director		$825 00	$266 26		$1,091 26
Conservation and protection (patrol and law enforcement):					
Chief and assistants	$49 86	$1,674 99	$201 35		$1,926 20
Clerical and office	13 89	1,230 00			1,243 89
Rent			107 46		107 46
Automobiles	210 66		186 38		397 04
Captains and deputies	345 96	36,673 17	28,681 87	$44 00	65,745 00
Patrol launches	262 86	495 00	60 45	3 50	821 81
Protection:					
Lion bounties			1,740 00		1,740 00
Lion hunting		405 00	135 68		540 68
Statistics and game problems	4 61	1,185 00	90 30	10 04	1,289 95
Total conservation and protection	$887 84	$41,663 16	$31,203 49	$57 54	$73,812 03
Commercial fisheries:					
Chief and assistants	$69 56	$4,318 48	$519 87	$80 83	$5,018 74
Deputies	6 50	5,379 52	1,056 26	3 10	6,445 38
Patrol launches	563 61	580 00	686 73	27 51	1,857 85
Laboratory research	165 30	5,556 77	1,056 85	859 08	7,638 00
Statistical	28 48	1,209 00	174 13		1,411 61
Salmon tagging	512 00				512 00
Total commercial fisheries	$1,345 45	$17,073 77	$3,493 84	$970 52	$22,883 58
Fish culture:					
Chief and assistants	$25 74	$999 99	$23 99		$1,049 72
Clerical and office	21 98	960 00	12 40		994 38
Rent			557 40		557 40
Automobiles	601 03		274 96		875 99
Hatcheries	3,930 43	19,167 75	1,734 08	$4,158 85	28,991 11
Hatcheries, additions and betterments				24,013 77	24,013 77
Special field investigation	8 20	1,767 50	319 63		2,095 33
Total fish culture	$4,587 38	$22,895 24	$2,922 46	$28,172 62	$58,577 70
Screens, ladders and pollution:					
Chief and assistants	$6 40	$2,195 32	$508 56	$83 03	$2,793 31
Game propagation:					
Game farm	$1,083 15	$1,965 00	$369 91	$969 63	$4,387 69
License commissions			$9,747 08		$9,747 08
Total expenditures	$8,840 39	$96,537 65	$54,091 40	$31,793 42	$191,262 86

CALIFORNIA FRESH FISHERY PRODUCTS FOR MONTHS OF JANUARY, FEBRUARY AND MARCH, 1927.

Compiled by Fish and Game Commission, Department of Commercial Fisheries.

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Sacramento, San Joaquin	Alameda, Contra Costa	San Francisco, San Mateo	Santa Cruz	Monterey
Albacore									--
Anchovies				--					11,012
Barracuda									19
Bonito									1,906
Carp		2,896		1,194	20,743	4,291	375		--
Catfish		50,626		1,377	29,282	4,440			--
Cultus Cod	285	1,430					76,016	4,865	35,206
Flounders	20,455	9,360	3			2,393	156,097	3,626	161
Grayfish						102	101,012		--
Hake							3,529		--
Halibut	30,533						2,576	113	727
Hardhead					11,742				--
Herring	49,237		1,400			1,100	723,510		1,400
Kingfish							2,572	10,085	61,153
Mackerel								30	230,297
Mackerel, Horse									6,514
Mullet									--
Perch	33,575		20,338			633	13,274		2,150
Pike				146	1,928	3,558			--
Pompano									64
Rock Bass									--
Rockfish	9,910	6,580					263,678	185,019	422,732
Sablefish	7,972						80,867	31,293	2,179
Salmon	58			4,427	8,077	6,363	125	1,240	4
Sandabs		6,790					132,007		220
Sardines							749,965		55 040,890
Sculpin									--
Sea Bass—Black								100	--
Sea Bass—White									241
Shad				156	126	825	2,132		--
Shad—Buck				17,139	18,069	94,828			--
Shad—Roe				14,950	15,902	82,695			--
Sheepshead									--
Skates		390					96,276		1,023
Skipjack									--

CALIFORNIA FRESH FISHERY PRODUCTS FOS MONTHS OF JANUARY, FEBRUARY AND MARCH, 1927—Continued.

Species of fish	Del Norte Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Sacramento San Joaquin	Alameda, Contra Costa	San Francisco, San Mateo	Santa Cruz	Monterey
Smelt	13,505		6,095			681	31,218		6,588
Sole		79,425				120	2,101,536	6,378	2,372
Splittail					6,891	23			
Striped Bass			50	15,391	50,774	107,981	13,039		
Suckers					513				
Tomcod							250		
Tuna—Yellowfin									
Turbot			308						
Whitebait	19,431								151
Whitefish									
Yellowtail									
Miscellaneous	300			10		325	5,790		503
Total fish	185,261	157,497	28,194	54,790	164,047	310,358	4,555,844	242,779	55,827,511
Crustaceans:									
Crabs	[1]47,064	[2]96					[4]1,012,848	[6]58,584	[7]1,248
Shrimps			128,468				103,824		
Spiny Lobsters									
Mollusks:									
Abalones									300,789
Clams—Cockle			2,259						
Clams—Mixed	4,349		13,910						
Clams—Pismo									
Clams—Softshell			22,920			9,245	12,630		
Cuttlefish							1,171	799	5,799
Mussels							2,918	175	10,865
Oysters—Eastern			[3]2,575				[5]184,580		
Squid									18,518
Totals	236,674	157,593	198,326	54,790	164,047	319,603	5,873,815	302,337	56,164,730

All amounts shown in pounds unless otherwise specified. Albacore and skipjack cleaned.
[1] 1961 dozen. [2] 4 dozen. [3] 11,708 shell oysters. [4] 42,202 dozen. [5] 839,000 shell oysters. [6] 2441 dozen. [7] 52 dozen.

CALIFORNIA FRESH FISHERY PRODUCTS FOR MONTHS OF JANUARY, FEBRUARY AND MARCH, 1927—Continued.

Compiled by Fish and Game Commission, Department of Commercial Fisheries.

Species of fish	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego, Imperial	Total	Mexican, brought into California via San Pedro	Mexican, brought into California via San Diego	Total Mexican brought into California
Albacore								
Anchovies		14,137			25,149			
Barracuda	7	7,251		15,450	22,727	664,454	126,898	791,352
Bonito		16,072	293	1,252	19,523	1,430	9,411	10,841
Carp		2,601			32,100			
Catfish					85,725			
Cultus Cod		775			118,577			
Flounders		292	7		192,394			
Grayfish		5,638		36,020	142,772			
Hake					3,529			
Halibut	50,365	253,806	12,966	29,734	380,850	1,425	117,901	119,326
Hardhead					11,742			
Herring	542			3,026	780,215			
Kingfish		153,323	152	587	227,872			
Mackerel	934	663,752	83,011	156,956	1,134,980	308	10,338	10,646
Mackerel, Horse		107,370			113,884			
Mullet				261	261	4,890	11,823	16,713
Perch	434	21,273	16		91,693	6,804	555	7,359
Pike					5,632			
Pompano		635		9	708	20,881	1,535	22,416
Rock Bass	408	18,842	13,261	12,547	45,058	2,635	31,602	34,237
Rockfish	33,523	1,119,408	1,248	359,813	2,401,911		6,797	6,797
Sablefish	5	1,689			124,005			
Salmon					20,294			
Sandabs		3,658	5		142,680			
Sardines		89,907,000	50	2,142,727	147,840,632			
Sculpin	6	25,954	418	10,640	37,018			
Sea Bass—Black	104	5,628	8,332	3,770	17,934	1,722	77,369	79,091
Sea Bass—White	2,924	25,211	7,900	3,136	3,239	736,155	49,438	785,593
Shad					3,239			
Shad—Buck					130,036			
Shad—Roe					113,547			
Sheepshead	219	41,346	339	14,415	56,319		610	610
Skates		4,825	4		102,518			
Skipjack							136,335	136,335
Smelt	23,266	108,714	18,336	7,763	216,165	9,193	320	9,513
Sole	26,559	6,330	986	1,770	2,225,476		22	22

CALIFORNIA FRESH FISHERY PRODUCTS FOR MONTHS OF JANUARY, FEBRUARY AND MARCH, 1927—Continued.

Species of fish	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego, Imperial	Total	Mexican, brought into California via San Pedro	Mexican, brought into California via San Diego	Total Mexican brought into California
Splittail					6,914			
Striped Bass					187,235			
Suckers					513			
Tomcod					250			
Tuna—Yellowfin		113			113	152,684	1,122,541	1,275,225
Turbot					308			
Whitebait					19,582			
Whitefish	13	98,989		8,103	107,105	2,246	6,626	8,872
Yellowtail		3,712	23	921	4,656	69,681	84,544	154,225
Miscellaneous	2,962	28,291	1,444		39,625	7,949	13,463	21,412
Total fish	142,271	92,646,635	148,791	2,808,900	157,272,878	1,682,457	1,808,128	3,490,585
Crustaceans:								
Crabs					[1]1,198,840			
Shrimps					232,292			
Spiny Lobsters	24,830	41,986	3,591	29,001	99,408		570,873	570,873
Mollusks:								
Abalones	6,379				307,168			
Clams—Cockle					2,259			
Clams—Mixed					18,259	5,587		5,587
Clams—Pismo	44,971				44,971			
Clams—Softshell					44,795			
Cuttlefish		91			7,860			
Mussels	91				14,049			
Oysters—Eastern					[2]187,155			
Squid		28,181			46,699			
Totals	218,542	92,716,893	152,382	2,837,901	159,397,633	1,688,044	2,379,001	4,067,045

[1] 46,660 dozen. [2] 850,708 shell oysters.

o

52683 7-27 8,500

CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

Volume 13 SACRAMENTO, OCTOBER, 1927 Number 4

CONTENTS.

		Page
THE DEER OF CALIFORNIA	*E. Raymond Hall*	233
BAGGING BROADBILLS IN CALIFORNIA WATERS	*Coburn F. Maddox*	259
FISHING CONDITIONS IN LAKE TAHOE	*George A. Coleman*	261
POACHERS AND GAME LAW VIOLATORS	*Walter R. Welch*	264
EDITORIALS		269
COMMISSION ACTIVITIES		286
LIFE HISTORY NOTES		294
CONSERVATION IN OTHER STATES		296
REPORTS—		
Violations of Fish and Game Laws		299
Statement of Expenditures		301
Fishery Products, April to June, 1927		302
INDEX TO VOLUME 13		305

THE DEER OF CALIFORNIA.

By E. Raymond Hall.

MAN'S INTEREST IN, AND USES OF, DEER.

If each person in California should list all animals of the state in order of their interest to him, I doubt not but that deer would top the list when all votes were cast. Much the same result would be expected in any state and, for that matter, in most countries of the world. This is primarily explained by the many uses man has found

it possible to make of deer. Also, because deer are found native on all continents except Australia and most of Africa, they are known to peoples of practically all lands. Furthermore this interest is of early origin for even the Neanderthal man, a now extinct race that lived some 50,000 years ago in southern Europe, left drawings of members of the deer family on walls of caves. Indeed, certain implements left by Neanderthal man were made from the bones of deer. Probably deer were valued also by primitive men that lived long before the Neanderthal race.

Certainly deer were of extreme importance to many primitive peoples. For example, certain North American Indian tribes not only relied on deer as a staple article of food, but from the deer's skin prepared buckskin that was used for making moccasins, clothing, tepees, thread and a variety of other things. Needles, awls, scrapers of certain kinds, some ornaments, arrow straighteners and a multitude of other articles were made from the bones of deer.

In the early settlement of North America by the white race, deer were of great importance, especially as a source of meat supply to the explorers and pioneers. Buckskin was quite as useful to these people as to the Indians. After settlements were established in many parts of the new country, deer hunting constituted a profitable occupation. Many deer were sold in the public markets for food. More were killed for their hides. Some idea of the vast numbers killed for this purpose is had from the fact that in 1880 the forwarding firm of Bush and Johnson, of Redding, California, handled 35,000 deer hides all obtained in Siskiyou, Trinity and Shasta counties. The average price paid was fifty cents per hide. Two men alone are said to have shipped 3000 skins to San Francisco in one year. However, this soon had to be discontinued, for with the rapid settlement of the country, extinction of the deer was imminent.

The uses made of deer at the present time are many. There is the use that scientists make of many animals. Every kind of animal, since obviously no two species are alike, is of value to the scientist but the deer is of particular value since it is one of the few large mammals that still exists throughout much of its former range. This is especially true in California, for here man has not transplanted one form into the territory of another and thus caused an unnatural mixing of kinds as, unfortunately, has been done in some parts of our country. Wise protection must be based on a knowledge of the life history and habits of deer as determined by the scientist.

The aesthetic and recreational value of deer is well known. Deer have an aesthetic value to anyone who enjoys seeing them or who enjoys knowing that they occur in a given region. Mere knowledge that deer exist in a given tract of woodland at once endows this with added interest to most persons. The ever growing number of people, nature lovers as they commonly are called, are especially interested in preserving the deer because of their aesthetic value. These people, for instance, derive more pleasure from hunting deer with a camera than with a gun, and take keen delight in observing the animal in the wild and studying its habits. Frequently these observations are of real merit and are contributions to science, but it is, of course, coming to be more generally understood that aesthetic uses are self-sufficient; that is, scientific or direct dollar and cents values need not be attached

to many things to justify their usefulness. However, it may be pointed out that the recreational value of deer is fully as great to this type of person as it is to the hunter.

In 1926 there were 252,017 hunting licenses sold in California. With the creation of a new deer license law it was estimated that 75,000 licenses to take deer would be sold in the fall of 1927. At the end of the first month of the 1927 deer season, close to 5400 bucks had been taken. The annual toll is close to 12,000. Every one of the thousands of hunters has considerable sums invested in hunting equipment. They spend lavishly in travel. Because deer are abundant in California the hunters' investment totals several millions and their annual expense is considerable.

Statistics such as these indicate that thousands are interested in deer hunting in California; that deer have great recreational value. Many persons share in the enjoyment of the venison from each deer. In food value alone, without considering the worthwhile recreation furnished by the hunt, deer constitute one of the greatest game resources of the state.

In spite of the popularity of deer hunting and of an increasing human population, deer in California are holding their own as regards numbers. The state boasts of deer in practically every county. Numerous refuges to safeguard a breeding stock have been created. No radical reduction in either season or bag limit has been made in recent years. Sport for the hunter is still at hand.

At the present time, then, deer may be thought of as having scientific, recreational and aesthetic values which unite to give this animal a high standing in the mind of every citizen.

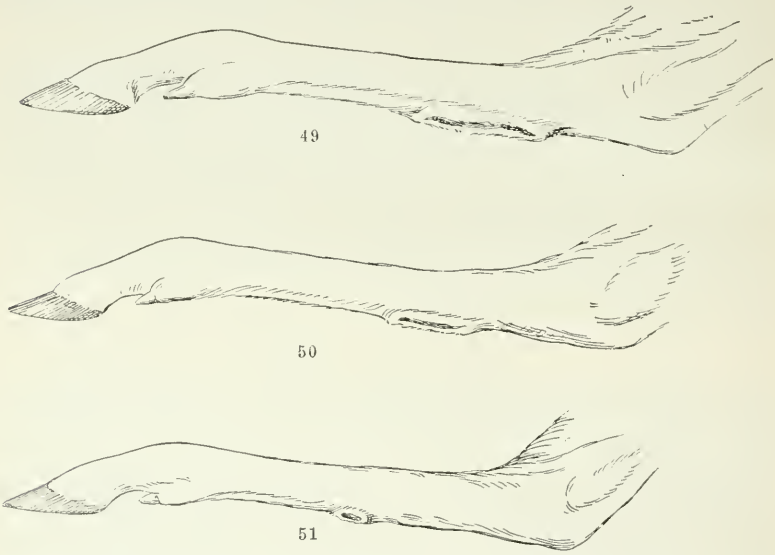
CHARACTERS OF DEER.

Two of the most outstanding characteristics of the deer family, that sharply separate it from other families of living hoofed mammals of North America, are the possession of antlers and several skin glands. Antlers may be defined as solid (that is without any differentiated core) bony outgrowths from the skull that are shed annually. They are confined to the male sex, except in reindeer and caribou, and their growth is controlled by internal secretions of certain ductless glands. At rare intervals females with antlers are found, but at least some of these individuals probably possess primary sex characters of both the female and male and are what are popularly termed hermaphrodites.

The antlers vary markedly with age. In the second fall a single spike represents each antler in most species, although in the mule deer this first antler is commonly forked and the same condition may occur in other species. In general, but by no means always, an extra point is added each year until the buck is five or six years old. After the sixth or seventh year the antlers commonly are not so large and the points may become fewer in succeeding years until, in old animals generally deficient in vigor, the antlers may be noticeably malformed and no more than mere spikes. Obviously, therefore, the number of points on the antlers furnishes no reliable guide to the deer's age. It may be mentioned that all malformed antlers are not due to old age. Some are due to early injury to the antlers themselves, and others are due to injury to the sex organs.

Each new antler begins to grow out from the base, or pedicle, in early spring, and until fully formed, is covered with a soft, hairy skin to which the appropriate name velvet has been given. In fall, the tips become hard and the velvet is stripped off, at least partly, by the deer's rubbing it against objects. Free of velvet, the antlers in time become smooth and polished except low down on the main shaft. They are displayed in this condition during the rutting season and are the weapons with which the bucks do combat with one another. Soon after the mating season, the antlers are lost and new ones shortly begin to grow.

Because of their porous nature these shed antlers soon decay if left exposed to the elements, as most of them are. They are also much gnawed by porcupines, mice and other rodents, all of which hastens their deterioration. These facts account for so few being seen in regions where deer occur.



FIGS. 49–51. Left hind legs of deer to show relative size and position of metatarsal gland in each (after Seton, *Life Histories of Northern Animals*, 1909). 49, mule deer; 50, black-tailed deer; 51, white-tailed deer.

Antlers, because they occur on one sex only, furnish a secondary sex character. Other conspicuous secondary sex characters of the male are furnished by his generally larger size and broader hoofs. The great enlargement of the male's neck at mating time might also be included here.

The skin glands, mentioned above, occur alike in both sexes. Pouches, or tubes as they sometimes are called, glandular in function, are found between the hoofs, and a glandular area is located just below each eye in what is called the lachrymal pit. On the inside of the hock there is another glandular area marked by long hair, but the most striking gland of this type is that located on the back of the hind leg between the hock and foot and called, on account of its position on the metatarsus, the metatarsal gland. (See Figs. 49, 50, 51.) The opening or

surface of the gland proper is bounded by long stiff hairs which lap over it but because of their great length clearly indicate its position. The characteristic deer odor mainly emanates from the two metatarsal glands.

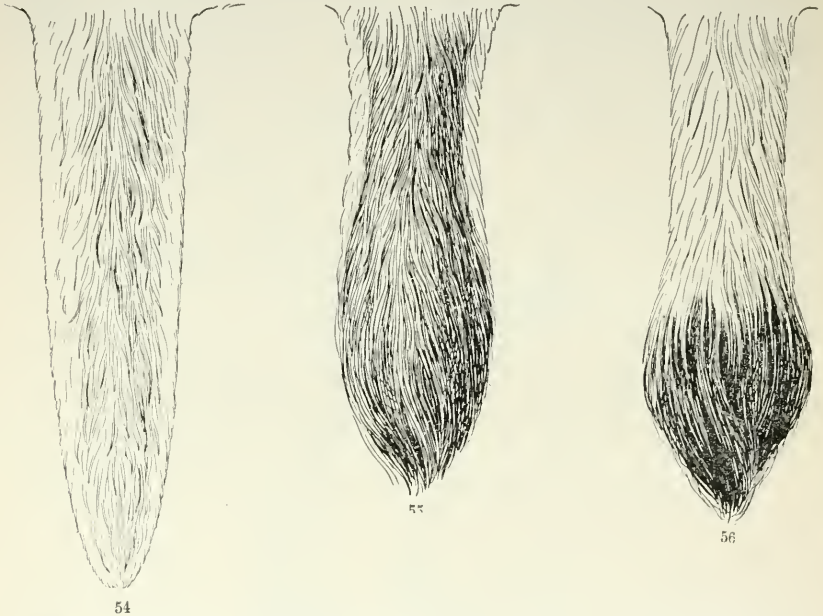
A hunter speaks of the deer "in the blue" and "in the red." These popular expressions serve in a way to denote the seasonal variation in the color of deer. They are, however, not thoroughly accurate, for the winter coat is grayish and the summer coat more brown in color.

Deer are so generally known that a formal description seems unnecessary here. The only animal in California with which the deer might reasonably be confused, is the wapiti or elk, an animal now almost extinct

FIGS. 52–53. Right antlers, from inside, to show difference between antlers of white-tailed deer and mule deer. 52, white-tailed deer (after Seton, 1909); 53, mule deer (No. 35257, Mus. Vert. Zool.; Mitchell Spring, Modoc County, California). The antlers of the black-tailed deer are of the same general, evenly branching type, as are those of the mule deer.

in the wild state. This member of the deer family may be recognized by its larger size; it usually being two or more times as large as a mule deer. Depending on the sex and the individual, wapiti vary from a little less than four to almost five and one-half feet in height at the shoulder and weigh from 350 to more than 1000 pounds.

In California there are three types of deer, the mule deer, the black-tailed deer and the white-tailed deer. The latter, the range of which is not shown on the distribution map, occurs in winter and only infrequently in northwestern California. Pacific buck, granite buck, prong buck and chemise deer are names commonly applied to young animals of the black-tailed or mule deer by some persons in the erroneous belief that the names denote species different from the black-tailed or mule deer.



FIGS. 54–56. Tails of three species of deer (modified from Stephens, *California Mammals*, 1906). 54, white-tailed deer; 55, black-tailed deer; 56, mule deer.

KEY TO THE SPECIES OF DEER IN CALIFORNIA.

A. Tail black (see Figs. 55 and 56); antlers branching dichotomously (see Fig. 53); metatarsal gland more than one inch long; bounds when frightened.
   a. Metatarsal gland more than 3½ inches long (see Fig. 49); only tip of tail black (see Fig. 56); ears large——Mule Deer—*Odocoileus hemionus.*
   b. Metatarsal gland less than 3½ inches long (see Fig. 50); tip and median dorsal stripe on tail black (see Fig. 55); ears medium——Black-tailed Deer—*Odocoileus columbianus.*

B. Tail not black (see Fig. 54); antlers with one main shaft and minor prongs branching off therefrom (see Fig. 52); metatarsal gland usually less than one inch long (see Fig. 51); runs rather than bounds when frightened——White-tailed Deer—*Odocoileus virginianus.*

DESCRIPTION OF SPECIES.

White-tailed Deer.

Odocoileus virginianus.

Characters.—Metatarsal gland about one inch long; antler with one main shaft and minor prongs branching off from it; hair coat reddish or yellowish brown in summer and gray in winter; tail relatively long and broad and largely white.

Range in California.—This species occurs only rarely in the eastern part of the Modoc region. It has been found only in winter and apparently does not breed in the state. (Range not shown on distribution map.)

Remarks.—The particular subspecies occurring in California is *Odocoileus virginianus macrourus.* The range of the species is more extensive than that of any other of our deer. It occurs throughout the eastern and southern states, throughout southern Canada except in western British Columbia, and in a considerable part of every western state except Nevada, Utah and California. It occasionally occurs in these three states. In the middle western states, the white-tailed deer has been largely exterminated. Two specimens have been taken in

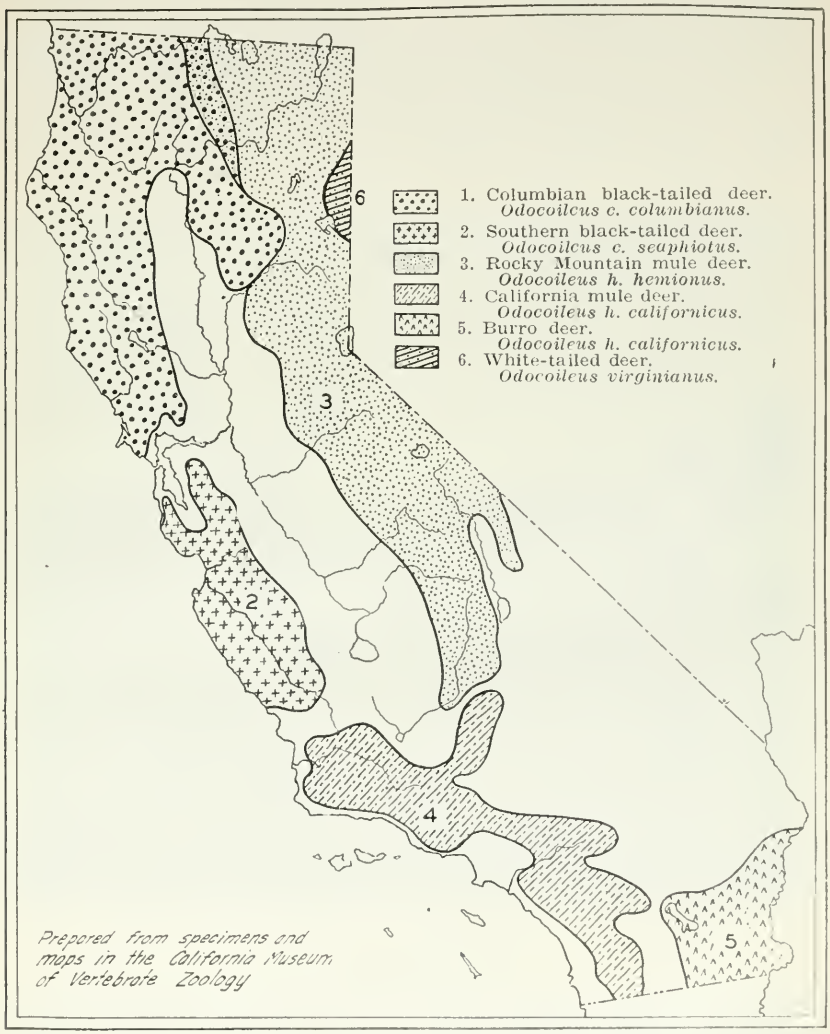


FIG. 57. Map showing distribution of various species of deer found in California.

recent years in eastern Lassen County, one forming the first authentic record for the state.

Hunters have suggested that the name whitetail is unfortunate. Most deer when startled, elevate the tail and thus display only the underside which is white; accordingly, the mule and black-tailed deer appear to have white tails. The name, however, is descriptive since the upper side (see Figs 54, 55, 56) is white, relative to the same parts of the two other species.

Habits.—This species has lost much territory in the east and middle west, but has gained some in the west and north. This is explained by the fact that the white-tailed deer can and does thrive in regions where the land is partly cultivated. In the northern and western part of its range, cultivation of part of the land seems to have created conditions favorable for the species. At least there is good evidence that it has followed the settlements.

Some account of the life history of the white-tailed deer, as taken from Ernest Thompson Seton (*Life Histories of Northern Animals,* Vol. 1, pp. 68-113, Chas. Scribner's Sons, New York City, 1909), may be given here. Seton's account refers to the northeastern form which probably differs slightly in habits from our western one. According to Seton (*loc. cit.* p. 76), "It is essentially a creature of the denser

FIG. 58. A black-tailed deer at the former Hayward Game Farm. Photograph by H. C. Bryant.

woods and thickets where these alternate with open glades. Bare plains and rugged hillsides are an abomination unto it; but every Western river whose long flood-flat is belted and patched with far-reaching scrubby thicket is sure to carry with it a long-drawn-out population of skulking Whitetails, which, between scrub and bog, are able to hold their own and multiply, in spite of rifle and Wolf; while the hill-frequenting Blacktail is rapidly passing away.

"In the hard-wood ranges of the East, this preference is less observable because all of the country is one thicket, but the life of the animal is

the same, and its chosen resort is the borderland between sunny open and friendly cover."

The white-tailed deer does not bound, as do the mule deer and black-tailed deer, but is now and then credited with making high jumps, probably for the purpose of better observing its surroundings. The white-tailed deer is said to be a good swimmer and to be able to make a canoeman race to overtake it. Accounts have been published of white-tailed deer that voluntarily took to the water and some, when hard pushed by enemies, have struck out boldly into the open sea. "They are indeed, so confident of their swimming powers that they invariably make for the water when hunted to extremity." (Seton, *loc. cit.* p. 93.)

During the mating season the bucks are reported to make wallows. In these holes, called *soiling pits*, in which water collects, a buck rolls and grovels much as a hog would do and plentifully besmears himself with mud. What pleasure or purpose there is in so doing is not known.

It is believed that but one fawn is born to the doe in the season she first gives birth to young. After this the number is usually two. There are numerous cases where three and, in one case, four embryos have been found in large does. The fawns are said to weigh about four and one-half pounds at the time of birth. Sufficient information is not available to indicate many points of difference between details of their lives and those of the mule deer fawns described later.

Seton (*loc. cit.* pp. 112–113) has this to say of the white-tailed deer:

> There is no probability that the Whitetail will ever serve man in any domestic capacity, but it will always have a value by reason of its singular adaptability and gifts. It is the only one of our Deer that can live contentedly and unsuspectedly in a hundred acres of thicket. It is the only one that can sit unconcernedly all day long while factory whistles and bells are sounding around it, and yet distinguish at once the sinister twig-snap that tells of some prowling foe, as far away, perhaps, as the other noises. It is the only one that, hearing a hostile footfall, will sneak around to wind the cause, study its trail, and then glide, cat-like, through the brush to a further haven, without even trying to see the foe who thus gets no chance for a shot. * * * It is the only one that has added to its range: that, in the North and West, has actually accompanied the settler into the woods; that has followed afar into newly open parts of New England and Canada; * * * and that can hold its own on the frontier.

In spite of this ability to extend its range and succeed in cultivated districts it is not likely that the white-tailed deer ever will be more than an occasional winter visitor within the boundaries of California.

BLACK-TAILED DEER.

Odocoilcus columbianus.

Characters.—Metatarsal gland about two inches long; antlers branching dichotomously; hair coat reddish in summer and gray in winter; tail black and relatively broad.

Range in California.—San Luis Obispo County, northward in the coast range to the Oregon line, and along western slope of Sierra at least as far south as Nevada County. See distribution map, p. 239.

Remarks.—The black-tailed deer occurs in the humid coastal belt from Alaska south to about Point Concepcion in California. Its range, then, is seen to be more restricted than that of the mule deer or white-tailed deer. The typical race (*Odocoilcus columbianus columbianus*), the Columbian black-tailed deer, occurs as far south as the San Francisco Bay region. The southern black-tailed deer (*Odocoileus columbianus scaphiotus*) which occurs south of the San Francisco Bay region has

larger ears and is paler colored. The cranial differences, which furnish the most constant and reliable characters, are not here mentioned for any of the subspecies.

Habits.—(By Dr. H. C. Bryant.) The Columbian black-tailed deer is a smaller, sleeker and more graceful animal than the mule deer. T. S. Van Dyke has suggested that it bears much the same relation to the larger animal that a thoroughbred Jersey bears to a Durham. This difference in general appearance is of course most noticeable when a close view is possible. In the open, these two species look and act much the same to an inexperienced observer.

The average blacktail seldom weighs more than 125 pounds dressed, sometimes a forked horn weighs around 50 pounds. The length of a buck is not usually more than five feet with a girth of about three feet at the shoulders. The mature black-tailed deer usually has fewer points than the mule deer. Frequently, indeed, large deer carry forked horns only. The antlers of a blacktail kept in captivity in Mendocino County possessed three points at eight years of age and four points on one side at nine years. The spread is sometimes as much as two feet. A fine head is more seldom obtained from this smaller species.

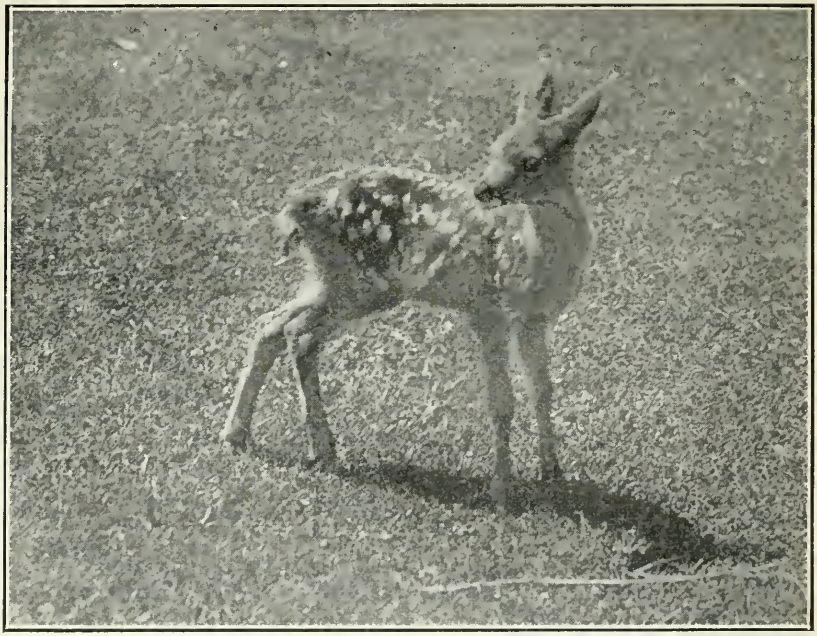


Fig. 59. Fawn of black-tailed deer at the former Hayward Game Farm. Photograph by H. C. Bryant.

The black-tailed deer is largely an animal of thick brush or thick forest. Seldom is a blacktail to be seen moving about in the heat of the day. It feeds almost entirely at night and seems to prefer moonlight nights. One may traverse considerable sections of the coast range without seeing a single deer and yet "sign" may be sufficient to show that deer are numerous in the vicinity. A black-tailed deer oftentimes gives up its feeding very early in the morning, even before sunrise, and lies down in the thick brush.

The brush belt furnishes plenty of tender leaves and twigs, and this forms the main food supply. As with other deer, grass is seldom touched. Leaves and twigs of salal, huckleberry, wild lilac and other shrubs are taken. In some places acorns form an attraction.

This deer has a keen sense of smell and many a hunter is amazed at the ability displayed in detecting his presence. As with other deer, this species will stand considerable noise, but quickly detects motion or human odor. The blacktail makes good use of its favorite hiding places in the brush, for it hides and sulks, often-

times allowing one to pass at close range without attempting to run. Undoubtedly it feels more safe in thick brush even at close range than in open country.

As the rutting season comes on, the necks of the males swell and they become very pugnacious. The rutting season varies in different parts of the state beginning earliest, in the latter part of August, just north of San Francisco Bay. In the extreme northern part of its range, bucks with swollen necks are not noticeable until about the first of November.

Fawns, two in number as a rule, are generally born between April and July, but sometimes much later. The coloration of the fawn is reddish brown with distinct whitish spots. The spotting is lost in the fall with the growth of the hair.

FIG. 60. Black-tailed deer shedding the velvet at the former Hayward State Game Farm. Photograph by W. N. Dirks.

MULE DEER.

Odocoileus hemionus.

Characters.—Metatarsal gland about five inches long; antlers branching dichotomously; hair coat rusty red in summer, grayish brown in winter; tail whitish with black tip; ears very large.

Range in California.—Throughout Sierra range and mountains of southern California. See distribution map, p. 239.

Remarks.—The different subspecies (geographic races) of this species have not been studied critically in recent years and the ranges shown on the accompanying map are therefore provisional. The various species of deer, however, are better

FIG. 61. Mule-tailed buck, Yosemite National Park. Photograph by Mrs. J. Knowles.

known and their ranges as shown on the accompanying map are determined with considerable accuracy. The typical form, occurring in the Sierra, the Rocky Mountain mule deer (*Odocoilcus hemionus hemionus*), has a wide range outside as well as inside the State of California. Some hunters believe that the extra large individuals in Modoc County, some of which are said to weigh, after dressing, more than 300 pounds, form a distinct variety. This has not been proved. Except for the size there are few tangible differences. The California mule deer (*Odocoilcus hemionus californicus*) has a more restricted range and outside of California occurs only in Baja California. This form is characterized by its more reddish coat, less extensive white rump-patch and greater extent of black on the tail. In fact the statement made in the key above, that only the tip of the tail is black, hardly applies to this subspecies for the black may be rather extensive on the tail. However, the long metatarsal gland seems to distinguish this race of the mule deer from the black-tailed deer. The third subspecies of mule deer known to inhabit California is the burro deer (*Odocoileus hemionus eremicus*). Its range, as shown on the distribution map, is in the desert region of southeastern California and, in common with other animals of this region, it is remarkable for its extremely pallid type of coloration. This is a large deer and the beams of the antlers, before branching, are relatively long. The tail is black on the tip only. By persons who have been so fortunate as to see this deer in the wild, it is said to be readily distinguishable from the other two races of mule deer in California. It is now rare in the state and no longer exists at many places where it was found fifty years ago.

The shape of the mule deer's tail varies much with wear. In adult animals the most distally located white hairs on the tail become broken and worn more than the tougher, terminal black hairs, thus leaving a tail with a bushy, black brush, a thin middle part and a wide base. In an unworn state, the outline of the tail is more symmetrical and it is only slightly constricted near the middle.

In northern California where the range of the mule deer overlaps that of the black-tailed deer, an occasional hybrid is found. One of these seen had the black of the tail-tip extending a short way up the middle of the upper side of the tail. The metatarsal glands also were intermediate in length between those of the mule deer and black-tailed deer. These hybrids, it should be understood, are rare and are the exception rather than the rule where the two species occur in the same territory.

Habits.—Within the range of a single species the habits of animals at one place may differ slightly from those of animals at another place. Thus it should be remembered that the following remarks on the life history of the mule deer are, unless otherwise stated, based on experience with the mule deer in Arizona* where *large numbers of deer* were present and where *food was scarce.*

The mule deer is an inhabitant of the more arid parts of North America. It does not occur in the humid coast belt of California or in the humid coastal part of the territory to the north of this state. Reference to the distribution map (p. 239), shows that the range of this species extends to the coast only in southern California, where, unlike farther north, the coastal region is comparatively arid.

In most parts of California the mule deer have separate summer and winter ranges. In spring, as the snow melts, the deer work up into the mountains and higher areas where they remain until fall. With the first heavy snowfall they migrate down to their winter range, the region, in northern California, covered by juniper and chaparral. Most of the mule deer, in this part of California, migrate down the eastern slope of the Sierra.

Little data on the range of individual deer are available. Bryant (*Journal of Mammalogy*, Vol. 5, No. 3, p. 201, 1924) states that the greatest known distance between points visited by a certain mule deer

*The author is indebted to the United States Bureau of Biological Survey under whose auspices the study of deer in Arizona was made in 1925, for the privilege of using this information.

doe, that had been marked by a metal bell strapped on its neck, was seventeen miles. Records of occurrence of this deer were obtained both on the summer and winter ranges. Certainly the distance between the summer and winter ranges of many mule deer is greater than this, but in some cases it probably is less. From repeated observation of the same individuals of mule deer in Arizona, recognizable by reason of peculiarities of structure, the writer concluded that within the period of observation, June 7 to July 28, 1925, few deer wandered over an area of more than two square miles.

On the winter range the animals sometimes congregate in large herds, but in California the mule deer usually are found singly or in small bunches. On the summer range, in some parts of Arizona where the writer has studied this species, there is an uneven distribution of deer. Does with fawns usually remain within two miles of water. The bucks, barren does and yearlings are more evenly distributed and may occur far from water. In the Sierra of California water is to be found every few miles and there is a correspondingly more even distribution of the deer here than in regions where watering places are long distances apart.

In their migrations to and from the winter range deer often use the same route year after year. This is especially true in rugged country where only occasional canyons cut through high, sheer cliffs that separate the summer and winter ranges. These canyons are utilized as migration routes and in fall, after the first heavy snow, literally hundreds of deer may pass a given point in such a canyon within a few hours. This "pass migration" is well known to hunters and in northern California many deer (more black-tailed than mule deer) are killed by persons who camp along these routes and wait until the migration takes place. There are places surrounded by escarpments so high that deer seldom are able to surmount the cliffs and thus do not occupy the otherwise suitable areas of summer range.

Among the factors that determine the distribution of mule deer, humidity, water to drink and high escarpments have been mentioned. Temperature and amount of snowfall are two factors concerned in causing the seasonal migration of deer and the former probably, at least indirectly by its effect on plant growth, is a factor in determining the geographical range of the species.

The actual number of deer in a given area is extremely hard to determine. In the areas in California where deer had to be killed to control the hoof and mouth disease, fully three times as many were killed as formerly were thought to exist in these areas. Many of those killed probably drifted into the depleted areas from the surrounding territory, but allowing for these, the number killed far exceeded the estimates previously made of the number that existed there.

Some attempt was made for several years to determine the number of deer killed in California. The reported kills for six consecutive years from 1911 to 1916 were as follows: 6489, 7537, 8269, 8699, 8343, 8072.

The reports were not compulsory and it is estimated by officials of the Fish and Game Commission that 12,000 were killed each year. A new tag system has been put in force, and definite figures of the number killed each year will be available hereafter.

The weights of some mule deer taken in Modoc County probably have been over estimated, but there is dependable data to show that mule deer of this region do attain large size. A buck taken in the lava beds by L. G. Renshaw in 1924, after hide, head, feet and entrails were removed, weighed 270 pounds, this being verified by Wm. S. Brown of the Forest Service (California Fish and Game, Vol. 11, p. 30). Two specimens taken in the Granite Mountains of Nevada about September 1, 1908, were weighed carefully by F. P. Cady with a pair of steelyards, after entrails and feet had been removed. One weighed 217 pounds and the other 220 pounds (California Fish and Game, Vol. 5, p. 205). A Modoc County five point dressed buck, said off hand to weigh 225 pounds, when actually weighed by Jay Bruce, state lion hunter, tipped the scales at 190 pounds. Mr. Bruce has found the larger mule deer bucks in the central Sierra region to weigh about 165 pounds dressed. One taken in the San Jacinto Mountains of southern California weighed 160 pounds. (H. C. Bryant, MS.)

At present man unquestionably is the prime factor in controlling the number of deer. He may reduce their number directly by hunting or indirectly by utilizing their range for purposes of agriculture, thereby destroying the environment essential to the deer's existence. On the other hand man may cause the number of deer to increase by destroying their natural enemies, by maintaining favorable conditions of forage and shelter and safe breeding places and by prohibiting or limiting hunting.

In California earnest effort is being made to maintain the present number of deer, and, in regions where they have become scarce, effort is being made to increase the number. The California Fish and Game Commission is charged with this work. One of the most effective means employed by this Commission to accomplish its task is the establishment of game refuges in various parts of the state. In these, deer find shelter and safe breeding places. Since no hunting, other than that of mountain lions and other natural enemies of the deer, is permitted on these refuges, they function as centers of dispersal from which the excess of the deer population spreads to the surrounding territory. Also, at no place in the state can deer be killed except during a limited period of six weeks in the fall and then but two bucks (one only of Modoc mule deer) are allowed each hunter.

Thus active means now are being employed to preserve the deer. In the main these efforts are successful but much study remains to be made of deer before the most effective conservation and utilization of them is possible. For example, the extent to which grazing by domestic stock can be permitted in the areas inhabited by deer without decreasing the number of deer remains to be determined. On this and similar problems the California Fish and Game Commission is gathering information and in time will be able to improve the now generally effective measures that aim to insure for future generations a sizable native deer population in the state.

Foremost among the deer's natural enemies, excepting man, are mountain lions. In fact mountain lions seldom occur where deer are not found and it is established that deer are the principal food of this carnivore. The mountain lion's method of attack, in general, like that of other cats, is silently to stalk the prey until close upon it, and then with one or a few swift bounds to spring out upon the unsuspecting

animal. Control of lions is maintained through a bounty system and the employment of a state lion hunter (See: Bruce, Jay. "The Problem of Mountain Lion Control in California." CALIFORNIA FISH AND GAME, Vol. 11, pp. 1–17).

Although destruction of deer by the above mentioned predators might, at first thought, appear to be without benefit, there is this to be considered: that in selecting the weaklings and diseased the species may be improved. It is conceivable that a given animal affected by some contagious disease might sooner be eliminated if predatory mammals were present than if they were not. As a result, the disease would be less quickly and less widely spread. However questionable the benefits in a particular case of this kind might be, certainly, benefits would be derived from a continual elimination of the unfit and the diseased of all kinds. Obviously, only the stronger, healthier, that is, the more virile, animals would be left to reproduce their kind and to perpetuate the species.

Coyotes destroy numerous deer. Fawns, yearlings and weaklings are particularly liable to attack, but full grown, healthy bucks seldom are killed. In one case known to the writer a single coyote ran down and killed a yearling doe, but several coyotes frequently unite in the chase. Occasionally one lies in wait until the deer is close by, whereupon it secures the prey by a quick rush. Nearly always the deer is dragged down and killed by bites in the throat and lower neck. It should be remembered that in many places where deer are found, coyotes feed largely and sometimes altogether on rodents and occasionally partly on insects. Also coyotes occur abundantly in regions where deer are not found. However, in some places, as for example in Trinity County, coyotes are destructive to deer, particularly in winter when snow covers the ground.

Bobcats are known to kill deer, especially fawns. Mr. Jay Bruce reported that in January, 1916, a fawn was killed near Wawona in deep snow lightly crusted. The tracks were followed and two bobcats were killed. Accounts have also been published of deer being killed by bears, wolverines, fishers and bald eagles.

Deer harbor several parasites. A fly larva frequently infects the nasal region. Ticks are not infrequently found in the ears and on other parts of the deer. A louse peculiar to deer, and at least two kinds of fleas are included among the external parasites. Several species of blood-sucking dipterous insects annoy deer. One species, commonly known as the deer fly, swarms about the deer both while they are on the move and when lying down. However, the deer is well equipped to meet the attacks of this and similar pests for the cutaneous maximus muscle, whose function it is to shake the skin, is well developed and extends back to the area that can be brushed free of flies by the tail. Deer that have been lying down often run a little way after getting up, presumably, in order to rid themselves of these flies. Deer are subject also to pink-eye and some that were temporarily blinded by the disease have been known to fall over cliffs and kill themselves in this way. Tumors are sometimes found on the necks of deer and, in at least some cases, prove fatal. Liver flukes and several other parasitic worms are often found in deer. The list of natural enemies and diseases doubtless could be greatly extended with more study, for deer are known to be subject to certain diseases of cattle and horses, at least

diseases of the same general nature, for example, the hoof and mouth disease and distemper; and they probably have others not known in domestic stock.

Serious outbreaks of disease among deer have occurred in California. One such was the epidemic that appeared in the southern part of Trinity County in the summer of 1911 and that spread from there to southern Humboldt, northern Mendocino, northern Lake and western Tehama counties. Although the exact cause of the disease never was definitely determined, there is some evidence indicating that it was a bladder worm infestation. It was believed, on good evidence, that 5000 deer died in Trinity County alone from the disease. In this case the black-tailed deer was the one affected. At least twice since, smaller outbreaks of similar nature have been reported from these northwestern coast counties. Many deer died in Modoc County in 1925 from a disease that never was well understood. The most destructive recorded outbreak of disease occurring among deer in California was that of the hoof and mouth disease. This disease spread from cattle to deer in 1924 and although few deer succumbed to the disease before it was stamped out, many thousands of deer were killed as a necessary part of the eradication methods employed.

FIG. 62. Mule-tailed deer at salt log, Lassen National Forest. Photograph courtesy of the United States Forest Service.

Deer are, of course, subject to accident. One way in which many are killed annually is by getting one or both hind legs caught in wire fences over which they attempt to jump. Fawns have been found dead with a leg caught between two parallel limbs. The mule deer's habit of jumping over limbs, logs and other obstacles that it happens to encounter probably renders it more liable to accidents of this kind than are most other animals. In the case of wire fences, however, mule deer, unless frightened, attempt to go under or through, rather

than over the same. Oftentimes, too, deer are snagged on branches and stubs. Hunters have taken specimens in which parts of sharp pointed branches, as much as eight inches long, were found. In some cases the flesh had completely grown around these and the deer was seemingly not greatly inconvenienced by them.

Accounts of early explorers and naturalists indicate that mule deer formerly were often found in large herds. However, a few years of hunting are said to have resulted in breaking them up and large herds now are found in but few places. In 1923, on the VT Park (local expression for De Mottee Park, U. S. G. S. Kaibab Quadrangle Sheet, 1886) meadows of the Kaibab Plateau, in Arizona, observers counted, in one evening, more than 1000 deer. Studies indicate, however, that the congregation into herds at this place is not so much the result of gregarious instincts as it is of the localization of a favorite forage plant, a species of native clover. Perhaps some of the huge herds observed in the early part of the nineteenth century also are to be explained on this basis. However this may be, mule deer are gregarious to a degree and, in places where they are not hunted diligently, do congregate in herds. This is said to be especially true on the winter range. It is also true on the summer range. It may be pointed out that, until the past two years, no hunting has been allowed on the Kaibab Plateau for a long period and that the deer are, or at least were two years ago, in a more natural state than in most parts of their range. Here herds of five to twenty deer were common in July. Sometimes these herds were composed entirely of bucks, again they were made up of barren does and yearlings and occasionally, but not often, of bucks with yearling and barren does. In certain herds of bucks the same individuals associated together for several weeks. They not only grazed as a herd but bedded down together and in all respects acted as a permanent association of individuals. Does with fawns, however, and many other deer, in fact most of them, associated with one another, if at all, only when feeding.

The pugnacity of bucks during the mating season is well known. Although the fights at this time are most strenuous ones, fatalities apparently are rare. Occasionally, however, the antlers become interlocked in such a way that the combatants can not draw apart and then the death of both animals ensues. Probably any earnest combat in summer or early fall, at which time the antlers are in the velvet and have soft tips, would be decidedly painful. The bucks are more sociable in late summer and seldom manifest hostility toward one another. In an observed instance, at this time of year, one buck, while lying down and chewing his cud, was seen resting his head on the flank of another buck lying beside him.

Sometimes the older bucks see fit to make threatening rushes at young bucks or does when the latter are feeding on some choice spot desired by the former, but earnest combats seldom are, if ever, indulged in. At this time of year, however, the does are shorter tempered than the bucks and do engage in serious combat. In one fight seen, each participant began by lowering the neck to a horizontal position, straightening the head out on a line with the neck, and laying back the ears. The two then, always keeping face to face, with noses about two feet apart, circled about until finally they reared up on their hind legs and struck viciously at one another with the forefeet, the only weapons

employed. After rearing up for the third time one secured the advantage, and when its adversary fled, pursued it and administered a couple more sharp blows on the rump.

The mule deer are not the timid creatures that deer in general are sometimes thought to be. They are cautious rather than timid. In most cases, unless *convinced* that there is danger, they choose to remain and investigate rather than flee at the first alarm. Their habit of stopping for a "last look" after first being startled is well known to hunters. Several times, deer, whose suspicions were aroused by my presence in the vicinity, spent as many as twenty minutes in watching me while I lay motionless. When attempting to satisfy their curiosity in cases of this kind they usually move about and observe the object of interest from several points of view. In so doing they never were seen to approach closer than to within twenty feet of the thing being investigated. Although extremely curious, they convey the impression that they also are extremely cautious. This manner of behavior would appear to be of no little advantage to the deer if their suspicions were aroused by an at first unrecognized object that should prove to be a mountain lion.

Usually mule deer require much visual inspection of a still object to determine its nature, although, like man and many other animals, they are quick to note any movement. Their sense of hearing, however, unquestionably is keen. A slight sound barely audible to the human ear at a distance of five feet usually will be detected by a deer at a distance of from twenty to thirty feet. Their sense of smell likewise is keen. Several times deer "up wind" that I was watching changed their position to "down wind," whereupon they immediately detected my presence. It often happens, too, that deer become suspicious of an observer and look directly and intently at him, but satisfy themselves concerning his identity only after taking a position "down wind" from where they get his scent.

In addition to detecting danger directly through their own senses deer become aware of danger through the actions of their fellows. Let one deer manifest curiosity in a given object and it is not long before all the deer within a radius of 100 yards of the first also approach to investigate. When unusually concerned about something of which they are suspicious the deer sometimes snort. Both does and bucks do this. The snort is accompanied by a quick toss of the head and sometimes by a stamping of the forefeet. This behavior is certain to attract any other deer that are nearby, who often come on a trot. Other than the snorting and stamping, no noise or action that could be interpreted as a means of signaling to one another has been noted by the author. Indeed the only vocal sound from adult deer the writer ever has heard is the bleat of wounded deer. Other observers, however, have reported additional vocal sounds for adult mule deer.

When bounding the mule deer apparently strikes the ground with all four feet simultaneously. The impact is considerable, for it can be heard a long distance. This bounding gait is almost invariably adopted when the animal becomes frightened and flees from suspected danger. It is used in going both up and down hill as well as on level ground. The animal not only clears a long horizontal distance at each bound but rises vertically to quite a height. Seton (*loc. cit.* p. 140) found that the distance between tracks of running mule deer sometimes was as

much as 25 feet and the writer once measured a fence six feet high over which deer jumped with several inches clearance. A gait of this type would appear to be of economy to the forest-dwelling mule deer whose path is strewn with fallen logs, branches and bushes which it must pass over.

Although the bounding gait is resorted to when the deer first are frightened it is also used at other times. Deer even when not frightened many times change their gait from a trot to a bound, as for example, when entering open parks to feed. It is interesting, too, that fawns less than a week old sometimes bound when startled.

The mule deer can make rapid time by trotting. On rare occasions, when badly frightened, they change the bounding gait to a running one similar to that of the white-tailed deer. When in this gait the head is held low and the speed attained is believed to be greater than when they bound. When walking about unfrightened, a deer holds its head lower than when running, bounding or trotting. However, when one becomes suspicious of something the head is held well up and the feet are alternately lifted slowly and then let down with a quick jerk. Such an attitude indicates that the deer is on the verge of bounding away.

The mule deer is not as long winded as, for instance, an antelope. After running half a mile, or sometimes a shorter distance, a deer pants heavily. Nevertheless, its bounding gait seems better adapted to the brushy, broken country that usually is its habitat than are the gaits of its enemies, and this generally makes the mule deer the winner in any race for its life.

During June and July, at least, mule deer usually lie down between the hours of 8 a.m. and 4 p.m. When in herds at this time of day the bedding ground is in the open timber and so located that anything approaching it can be seen at some distance. However, when resting singly, the places chosen are usually the most concealed ones to be found, except in the case of does that have young fawns, which choose locations that allow them to see the places where their fawns are concealed. Fir thickets or thick clumps of spruce are favorite places for the deer to bed down in. A bed is sometimes used by the same individual deer on several consecutive days. In nearly every case these concealed beds permit exit and entrance from two sides and are in deep shade. Some are as much as a foot and a half deep and probably are used for several summers. The beds of single deer and those of herds usually are made on thick carpets of deciduous leaves or evergreen needles.

In California, mating begins in November and extends into December. The bucks with enlarged neck glands become nervous, belligerent and restless. Nose to the ground they are said to often trail does for miles. Like other deer, the mule deer is polygamous. The period of gestation is about six and one-half or seven months.

On the Kaibab Plateau of Arizona the fawning season in 1924 reached its height in the last week of June and the first week of July. Fawns were born as early as June 15 and as late as July 25 and therefore varied as much as forty-one days in age. Seven pairs of twins were recorded among 234 fawns captured by parties engaged in rearing them in captivity. The writer saw only two pairs of twins in the field and the two pregnant does examined contained but one embryo

each. Combined data indicate that the ratio of twin to single fawns was one to fourteen. This is believed to be a lower ratio than usually exists and both it and the late fawning season probably are explained by the shortage of food at this place. The deer were in poor physical condition and this apparently directly reduced the number of young born to each doe. Local residents stated that the rutting period occurred later the previous fall than was usually the case when the deer were in better physical condition. In California, and in many other parts of the mule deer's range, twins appear to be more common than single fawns, and triplets are occasional.

Fawns vary greatly in size at the time of birth. One that was less than two hours old measured as follows: total length 570 mm. (22.441 in.); length of tail, 65 mm. (2.559 in.); length of hind foot, 240 mm. (9.449 in.); length of ear from notch, 110 mm. (4.331 in.). The corresponding measurements of an embryo ready for birth were 710 mm. (2.329 ft.); 110 mm. (4.331 in.); 280 mm. (11.024 in.); and 120 mm. (4.724 in.).

Some idea of the rate of growth may be had by comparing the following measurements with those of the same fawn when less than two hours old. On June 25, when 27 days old, this fawn measured: 700 mm. (2.296 ft.); 70 mm. (2.756 in.); 285 mm. (11.220 in.); and 120 mm. (4.724 in.). Thus in less than a month the increase was 130 mm. (5.118 in.) in total length; 5 mm. (0.020 in.) in length of tail, 40 mm. (1.575 in.) in length of hind foot and nearly 10 mm. (0.394 in.) in length of ear. Because this fawn was in captivity it may not have grown as fast as it would have in the wild. However, it apparently was in good health.

With all, the young fawn is a curiously proportioned, yet handsome, animal. Although the ears and legs are disproportionately long they are delicately formed and are used in anything but an awkward manner. The numerous, irregularly arranged white spots set on a brown ground color form a delicate color pattern quite in harmony with the fawn's graceful movements and generally charming yet sprightly appearance. The color varies quite as much in animals of the same age as does the size. The arrangement of the white spots is hardly the same in any two cases and the ground color varies from light yellowish brown to almost pure black. These differences are individual ones and are not correlated with sex as the writer suspected before carefully looking into the matter.

The does bearing fawns concentrate in areas near water and drink at least once and usually twice each 24 hours. In the first week of July, at which time it rained daily on the Kaibab, does with fawns were found as far as five miles from any lake or spring, but before and after this rainy period none were found farther than two miles from a source of water supply. At this place in Arizona where the summer range included the yellow pine belt and the higher fir belt more fawns per square mile were found in the first mentioned belt. An understanding of the does' fawning habits explains this. In both types of forest the fawns are born, and, while small, live in a definite type of habitat. The place chosen by a doe is, almost without exception, a high point of land or ridge at the junction of two canyons or where a canyon curves, thus partly encircling a piece of high land. Furthermore, the timber must be relatively open. The latter condition exists

on practically all points of the type mentioned above in the yellow pine belt, but in the spruce and fir belt some points are covered with a far denser growth of timber than are others. On the more thickly timbered points no fawns are found, while on other points in the fir zone, that differ only in being less densely covered with timber, many fawns are found. The doe's need of detecting approaching enemies probably is one factor in determining the choice of these points of high land covered by open timber as fawning grounds.

Until they are five weeks old the fawns remain hidden most of the time. Some were found, less than one hour old, lying in the open, but older ones than this commonly lie beside a log, in a tangle of fallen limbs or under a bush. In situations of this kind they are relatively inconspicuous for they lie flat on the ground and their spotted coats harmonize with a variety of backgrounds. The neck is held straight out or slightly curved and the large ears are tightly folded against it. The hind legs are doubled forward under the belly, thus permitting the fawn to bound up and away at an instant's notice. However, they often allow one to come to within a few feet of them and do not move, but the older the fawn the more apt it is to flee when approached. After leaping up and when only a few feet from its hiding place, one very young one dropped flat on the ground when a hat was thrown at it, and others did the same thing after running a hundred yards or so from dogs that pursued them. The instinctive reaction of a very young fawn to sudden danger is to drop flat on the ground and lie motionless. The survival value of this behavior, after the fawn has once started to run from an enemy, is hard to understand. On the other hand, it is easy to understand how, when they lie still and do not run at all, they escape many enemies, that otherwise surely would find and destroy them. If the young fawns possess no scent, the apparent value of this instinct to lie motionless is considerable. The commonly held belief that fawns have no scent is apparently well founded. The characteristic odor of adult deer emanates largely from the metatarsal glands. Although when the fawn is born these glands are readily recognizable due to the thick, long, coarse hair that marks their position, they yield no odor as do the same glands on older deer. None of the dogs, including one trailing hound, which the writer watched catching numerous fawns, ever followed them by scent. Probably the scent develops when the fawn is almost six weeks old.

Each doe keeps close watch on her offspring and it is not often that a person can approach the fawn without being detected by its mother. Most of the time she does not remain right with the young fawn, but she seldom is farther than 150 yards from it, except when she goes into some meadow to feed, and even then she does not venture far away for any great length of time. When a person approaches a fawn, the doe often comes a little way toward the intruder and remains within 40 to 75 yards until the fawn bounds away, when she, too, quits the region. At such times, the doe's ability to keep track of her fawn is remarkable and often hard to explain, but in numerous observed instances, she always came back to very near the place where the fawn had hidden itself.

A digression to point out certain facts about lost fawns seems permissible here. It happens every year in the Sierra that kind-hearted

people find and bring home to feed on a bottle "lost fawns." Incidentally, most of these fawns soon die at the hands of their would-be benefactors. The facts are that nine out of every ten "lost fawns" are not lost at all. Very young fawns are lank, ungainly creatures and do suggest a starved animal. Also, young fawns, like lambs, sometimes follow a person who chances to pass close to them on horseback, or even on foot. Thus, many persons are led to mistake properly cared for fawns for lost ones and out of pity to take them home to rear by hand when all the while the doe was anxiously watching the kidnappers from some concealed vantage point.

The does are capable of defending, and do defend, their fawns from some formidable enemies. An instance was once reported to the author, by Bob Vaughn, of a doe chasing a coyote, probably away from her fawn, and the coyote was said to have been doing its utmost to absent itself from the general vicinity and especially from the particular vicinity of the sharp hoofs on the doe's forefeet. Seton (*loc. cit.* p. 129) has reported a similar instance. Parties on the Kaibab engaged in catching fawns stressed the necessity of keeping near the dogs during the chase after a fawn, because of the fact that the doe would almost invariably run between the dogs and the fawn, when the former were not closly accompanied by man, and, by using her forefeet as weapons, would completely rout the dogs and thus allow the fawn to escape. Any other deer that were near a fawn being pursued, generally took equal parts with the doe to which the fawn belonged in fighting off the dogs. It is interesting that bucks as well as does did this. Although dogs of various kinds and sizes were used for pursuing and capturing fawns, none of them were able to cope with adult deer bent on defending a fawn unless man intervened.

Probably because of their maternal instincts, does that have young fawns are more alert for enemies than are other deer. When one deer indicates by its behavior the presence of suspected danger, does that have fawns in the vicinity are the first to investigate and the boldest in approaching the cause of alarm. They differ from the other deer also in that when the object of suspicion proves to be a real danger they bound only a short distance away and then stop at some place commanding a view of the intruder, whereas the other deer bound away far out of the danger zone.

When a doe, accompanied by her fawn, sights danger the fawn evidently recognizes the slow, deliberate, tense movement of its mother as the signal to hide, and this it does by dropping beside the nearest log or bush or often on the bare ground where it chanced to be standing. Other than the above-mentioned movements of the doe, no behavior that could have been the fawn's cue to drop and hide was seen in observed cases. However, a Mr. Price told me of seeing a fawn that dropped the instant the doe it was nursing sighted him and in this case the fawn seemingly received its stimulus through some sense other than sight.

Fawns one or two weeks old nurse twice daily and are found with the does from 7.00 until 10.00 in the morning and from 3.30 until 6.00 in the afternoon. The remainder of the time they lay hidden. Some fawns, only a few days old, were seen nursing as early in the afternoon as 2.00 o'clock and it may be that they nurse oftener than twice a day. Frequently the young are permitted to nurse when the doe is

lying down. When she is standing the young nurse either from behind or from the side, and butt vigorously, much after the manner of a young calf, as though they were not satisfied with the progress they were making. Usually the doe submits to this rough treatment without protest, but sometimes she appears to resent it and throws the hind leg forward or backward each time the fawn tries to nurse, thus preventing it from reaching the bag.

Fawns five or more weeks old accompany their mothers much of the time and enter open parks with them to feed. In large herds, fawns often become lost, or think that they are lost, and bleat long and loudly. This they seldom do when alone with the mother or with only a few adult deer. Although the fawns take but little forage before they are five weeks old, they do take some when no more than two weeks old. However, to fawns of the last mentioned age, browsing apparently is tiresome or at least not attractive, for they spend more of their time when with the doe in gamboling and frolicking about than in doing anything else. For no apparent reason the fawn will of a sudden take off at a rapid rate and then stop as suddenly as it started. Its next run usually carries it back in the direction of the doe at whose side it may stop or by whom it may run at a lively pace. When accompanying the does, fawns of this age seldom run farther than thirty yards from the doe and none were seen to remain away from her for more than two minutes at a time. When a small fawn does elect to forage it does so only when at the side of the doe and with its head near hers. Usually, too, it stands with the body axis parallel with the doe's and the idea that the fawn is imitating the doe is strongly borne in upon the observer's mind. After a nibble or two taken alongside its mother, the fawn soon makes off on one of its reckless dashes. The doe pays but little attention to these antics of the fawn and to judge from the behavior of the two the fawn is more concerned about keeping near the doe than the doe is about keeping near the fawn. Fright of the fawn at something is not taken by the doe to indicate that possible danger is near. For instance, on one occasion, while watching a doe and her fawn the latter came and peered over a log at me and then bounded away in great fright to a position that placed the doe between it and me. The doe, that was at the time only ten feet from me, cast a casual glance in the direction the fawn had taken and continued feeding. This behavior of the doe was in marked contrast to that of a few minutes later when I, while trying to follow the doe and her fawn through the timber, was discovered by another deer. Immediately, the doe came to the side of the other deer and soon discovered me, whereupon my observations of the relations of that doe and fawn to one another were necessarily over for the afternoon.

Mule deer are both nocturnal and diurnal. If to be classed as one or the other, they probably could best be called nocturnal animals, for they seem to be active during more hours of the night than of the day.

The following extract from the writer's report on the deer of the Kaibab Plateau, as observed during June and July of 1924, is pertinent here:

"At VT Park the deer usually become active about 4.30 p.m. After leaving their beds they wander down in the direction of the open park,

but do not enter it until 6.30 p.m. In the meantime they browse in the forest and gather in the edge of the timber about the park. Finally, as the shadows cast by the trees lengthen and creep eastward, a few bold deer venture out and follow these shadows to the clover patches which are located along the middle of the park some 100 to 400 yards distant from the edge of the timber. On dark, cloudy days, the deer enter this and other parks fully one-half hour earlier than on bright, sunshiny days. The presence of a few deer in the park apparently imparts confidence to the others lingering about its margin for soon they bound out and join those already in the open. Deer that may be recognized by individual peculiarities of structure enter the park each evening at the same place and leave it at the same place. Also, their time of coming and going varies little from day to day, except in so far as the cloudiness of a particular day causes them to come out earlier or to remain out longer than on clear days.

"The time of feeding apparently varies with the degree of molestation of the deer, for when the writer first visited the region of YT Park, early in June, some deer came into the park about 4.30 p.m. and nearly all had left by 7.30 in the morning. But later, when tourists arrived and daily attempted to study the deer close up, the bulk of the deer entered the park fully two hours later in the evening and left one hour earlier in the morning. In other parks seldom visited by man the feeding time remained practically the same and as it was in YT Park early in the season. Some deer fed in the park between 1 and 2 a.m. Whether or not these were deer that entered the park before dark and left after sunrise is not known. Probably they were not, for it seems unlikely that a deer would have to graze for twelve consecutive hours to secure the required amount of food."

It must not be inferred from the above that mule deer always feed in open parks, in meadows or in glades, for, like other deer, they are typically browsers, not grazers, and naturally much of their food is taken from various species of shrubs and trees.

When browsing, deer not only reach as high as is possible from a position on all four feet, but often rear up on the hind feet to reach desirable forage. In observed instances, bucks have been seen to rear up and place the forefeet, goatlike, against the trunks of trees and feed on leaves that otherwise would have been out of reach. Other instances were seen where deer were astride limbs which they held down while feeding on them. When released by the deer, some of these limbs sprang back to as high as five feet above the ground; thus, the deer must have reared on their hind feet and used the forefeet to catch and bear down the limbs.

When grazing, that is when eating off the ground, deer sometimes proceed in a straight course and sometimes turn slowly about, using, as it were, the hind feet as a pivot. Since the deer have no incisors above, forage has to be partly pulled or jerked off rather than actually bitten off. A bite of forage is grasped and then secured by a backward jerk of the head. Thus, the nose is jerked backward and, in bucks, the antlers are tilted forward at each bite, imparting thereby a "rocky horse" motion to the head.

Deer eat while lying down. Both bucks and does do this. After reaching out as far as possible over a half circle, the deer generally get up and feed in the usual fashion.

Mule deer do not prefer grasses (*Gramineae*). If watched at close range when grazing they can be seen to eat around the grass clumps and sometimes to drop small bunches of grass that they pull up accidentally with the more desirable plants. It is well established from laboratory analyses of stomach contents that deer feeding in meadows utilize the herbaceous plants and not the grasses. Various grasses are, of course, found in the stomachs of deer, but the percentage of grass is but a small part of the total and most of the grass is taken accidentally.

Little definite data on the food of deer in California are available to the writer. Dr. H. C. Bryant has supplied the following list of plants that he has seen the mule deer eat in the Yosemite region. These plants are:

Willow (*Salix*, sp.).
Aspen (*Populus tremuloides*).
Black cottonwood (*Populus trichocarpa*).
Oak (*Quercus* sp.).
Service berry (*Amelanchier alnifolia*).
Deer brush (*Ceanothus integerrimus*).
Snow brush (*Ceanothus cordulatus*).
Evening primrose (*Oenothera hookeri*).
Manzanita (*Arctostaphylos* sp.)
Snow berry (*Symphoricarpus albus*).
Apple (*Malus* sp.).
Mushrooms.

Of all these the deer brush apparently is the most preferred. Probably other species of *Ceanothus* than the two mentioned above also are eaten. Herbaceous plants in great variety are utilized. The acorns of the oak, as well as the leaves, are sought. Mushrooms furnish an important article of diet at the time they begin to push through the ground. It appears that deer have some means of locating them before they push above ground, for deer often paw away the pine needles in the forest to secure the concealed fungi. Deer are extremely fond of fallen apples, too, and in orchards where this fruit is allowed to lie on the ground, any deer in the near vicinity are almost certain to come and feed on it.

All deer are fond of salt. Mineral springs serve as licks and are an attraction to both sexes in summer. Apparently, deer from a considerable area will make excursions to these natural licks. Salt logs for cattle likewise attract deer in summer months and many a nature photographer has baited deer successfully by using common salt.

Deer oftentimes eat the leaves and twigs of orchard trees, particularly apple trees, in the mountains of California. The damage may be considerable; indeed the trees may be killed unless some means is employed to protect them. Since deer are the property of all people of the state, a person owning an orchard obviously has no legal right to kill the deer merely because they are damaging his orchard. It is his responsibility to properly fence, or to in some other way protect his orchard. Until recently, fencing was the only successful method of protection known and probably still is the best when all

things are considered. However, blood-meal and bone-flour have been found to be effective in protecting trees. These preparations mixed with water in proportion of one pound to five gallons, with a little glue for sizing, can either be sprayed or dusted, for instance, by means of a whisk broom, on the foliage within reach of deer. Their odor or taste, or both, are not at all to the liking of any of the browsing mammals and acts, it is said by the numerous people that have used it, as an effective repellent. Decaying meat of almost any kind is said also to be effective.

BAGGING BROADBILLS IN CALIFORNIA WATERS.

By Coburn F. Maddox.

During July, August and September, when our waters are at their warmest temperature, is the time of year the swordfish fishermen are busy. They equip their boats with a plank bowsprit 12 inches wide by 24 feet long, six feet inside the bow securely bolted to the deck with 18 feet extending out over the water. A waist-high rail is erected on the end, extending back on both sides about three feet. This so-called "pulpit" is held in position by steel wire stays running to the mast, the keel and each side of the boat so there is no sideways motion and only what up and down motion as would be caused by the boat itself pitching from the motion of the sea; this plank being so securely fastened as to be an integral part of the boat. Two men comprise the crew, one man to operate the boat and one to act as lookout and harpooner.

When the swordfish is sighted the harpooner takes his position in the "pulpit" and rests the harpoon horizontally across the railing of the "pulpit" and the helmsman gets the boat into the wind at full speed ahead so that the boat may get upon the fish while he basks in the warm surface water as is his habit. The harpooner balances the 14-foot shank of his barbed toggle-headed harpoon in his hand, lifts it, poses it above his head and hurls it when within fifteen feet of the unsuspecting target unless the fish becomes startled and starts to sound, then he casts instantly if the fish is not over 25 feet away. It is not often the swordfish are aroused by the approach of the boat, seeming gorged and sleepy, and the harpooner usually aims and strikes at the back of the head or where the head and body join and if his aim be true, not making another attempt necessary, but sometimes the harpooner gets as many as three casts before arousing Mr. Broadbill, whose family name is *Xiphias gladius,* and, like the gladiators of old, who also derived their name by the sword, he is a real battler when aroused. He attempts repeatedly to cut the line with his sword, which averages three feet in length and tapers from four inches to a flat, curved point one-half inch in width and, instead of sounding instantly as most fish do, he will roll from side to side, turning completely over in the water in his efforts to dislodge the barbed head of the harpoon. This head is attached to a quarter inch in diameter line about 300 feet long which is fastened to a five or ten gallon wooden keg. This keg is heaved overboard as soon as the victim is struck and when he sounds it acts as a buoy to tire him, as the deeper he goes the greater the

resistance, causing him to return nearer the surface, and also is a marker for the fishermen. This sounding and returning to the surface sometimes is repeated two or three times before the broadbill is brought to gaff. The reason for this method of catching the broadbills is that their flesh is, comparatively speaking, soft and if a line were secured to the boat the great weight of the fish pulling on a nonresisting line would tear the harpoon head out of the flesh, as they average 400 pounds in weight, sometimes growing to considerable size, one being delivered to the fishermen's pier at San Diego in the summer of 1925 that weighed 865 pounds.

When angled for on light tackle great care must be taken that these gladiators do not get under the boat, as the line may be cut by the propeller if Mr. Broadbill does not succeed in cutting it himself.

One of their peculiarities that makes them more or less easy prey to the commercial fishermen is the fact that a group of eight or ten swordfish seem to inhabit a certain locality to which they are attracted by food or temperature of the water and all the swordfish in the vicinity congregate at these chosen areas of about ten acres square and a fisher-

FIG. 63. Harpooning broad-billed swordfish for market, San Diego, summer 1927. Photograph by Coburn F. Maddox.

man may secure one or more from one of these gatherings before the others take alarm and move to some other selected place, moving singly or by twos, not in schools, as is usually the case with fish, but more independently.

This swashbuckler of the sea is not a popular fellow among fishes, attacking with the slightest provocation any other fish and fighting to the death. One was brought in recently with his sword severed close up to his head, great chunks torn out of his sides by sharks, having evidently been attacked by more than one shark, but was still living,

showing the wonderful vitality of the fish. They are not popular with the commercial fishermen either, as they attack tuna in nets, cutting the nets and searing the tuna and splitting up the schools, making it difficult for the fishermen to secure the tuna so much in demand by our packing industry. Their method of feeding when they get into a school of small fish, like mackerel or sardines, is to lash about them with their swords, killing and stunning all they can and then picking them up at their leisure.

The meat of the swordfish is a delicious, rich, white meat, somewhat resembling young pork, and is considered a delicacy in the retail market where it competes in price with the albacore, so-called "chicken of the sea," bringing in many cases as high as $300 per ton.

The public has shown its appreciation of this delicious food fish by the demand for swordfish meat having increased in San Diego markets from 33,005 pounds during the whole year of 1926 to 58,582 pounds in the first six months of the 1927 season, these figures being on the broadbills caught locally only; there having been some few thousand pounds imported from Mexican waters.

Due to the fact that the broadbill is what the trade calls "a good shipper," he demands a good price and can be kept much longer under ordinary refrigeration than any other fish of his size and is in great demand as a table delicacy. The broadbill does gain certain popularity dead that he did not enjoy while alive, as history has proved to us is often the case in the careers of men as well as fishes.

FISHING CONDITIONS IN LAKE TAHOE.

By George A. Coleman.

The resorts around Lake Tahoe persistently reported excellent fishing has been the rule this year during the trout season. These reports reached the Fish and Game Commission and the author was instructed to make an investigation of them to ascertain the cause of such good fishing. Hence, the month of June was spent in making an investigation of fishing conditions in Lake Tahoe.

The reports I find to be true, and, in seeking for the cause, I find that a number of factors enter in. Foremost of these factors that have made for such uniformly good conditions is the introduction of the several species of trout that are now being caught in such numbers. In fact, the results of the work of the Commission are just becoming evident. Without embarking on a history of the introduced species, it is sufficient to say that the Commission realized a number of years ago the necessity of placing in the lake a species of trout that would supplement the native species, since the latter were much diminished in numbers. Owing to their habits, they did not offer sufficient sport to the people who patronize the resorts and who, though not expert fishermen, desired to fish in the lake.

To appreciate the work of the Commission it is necessary to have an understanding of the various species of trout now existing in the lake.

The native trout (*Salmo henshawi,* Gill and Jordan) formerly occupied the entire system of lakes and streams extending from Pyramid Lake in Nevada to Fallen Leaf Lake and the Upper Truckee in Cali-

fornia. This trout can apparently adapt itself to greatly diversified conditions and exist under unbelievable circumstances, or it would have been extinct long ago. Formerly having the run of the Truckee River, Tahoe and Fallen Leaf lakes and all their tributary streams and breeding throughout this extensive area, it was easily able to maintain itself. However, when the timber of this watershed was logged off the flow of these streams was seriously diminished during the critical period of growth of the young trout. The run of mature trout up the Truckee River to their spawning beds was stopped by irrigation and power operations thereon and their natural breeding rate was accordingly greatly tampered with. Add to this, commercial fishing in the lake and uncontrolled sport fishing, along with a few epidemics, and the diminished supply of this native trout is explained.

Meanwhile it has been the work of the Commission to assist this trout in maintaining its hold in Lake Tahoe by taking its eggs and by exercising proper technique obtaining a many times larger percentage of fertilization than is obtained in the natural spawning of the fish. Then by hatching these eggs in the two hatcheries maintained by the Commission on the lake for this purpose, it is possible to rear many thousands of young Tahoe trout annually, thus replenishing the stock in the lake. That the work of the Commission in this line has been successful, is evidenced by the fact that this year the Commission has been able to obtain a larger number of Tahoe trout eggs than for many years past. Both males and females were found to be in perfect physical condition at the time of their spawning in April and May. Another evidence of the Commission's success is the fact that many fine specimens are now obtained in the lake by fishermen who know how to fish.

With this good start, it will be but a matter of a few years until the Commission will be able to restore the lake trout fishing to something like its former excellence. This will not be possible, however, unless the Commission has the complete cooperation of all the resort owners, patrons and sportsmen around the entire lake, not only in California, but in Nevada as well. It will be necessary to use the streams tributary to Lake Tahoe for the growth and development of the young Tahoe trout to the exclusion of any other species of trout for a few years at least. It may even be necessary to close these streams to summer fishing for a time in order to protect the young trout. The reason for such action is due to the natural habit of the young trout to run up these streams for food. When they are put in these streams late in the summer or early fall from the hatcheries, they have several months in which to grow before the snows of winter. During the winter of their first year, they are found in the deep pools of the streams until early spring. In the winter all the small streams, which are entirely dry in summer are covered with snow, under which myriads of insects are developing. As soon as this snow melts sufficiently to form running streams, the young lake trout begin to run up them, even under the snow, in order to obtain the abundant insect food. Here they soon attain a size of from five to seven inches in length. Now if these young trout are *not caught* out during the summer, they drop back into the lake in the fall and soon grow to be the half-pounders, pounders and pound-and-a-half trout which are so desirable during the

fishing season. If, therefore, we would have an abundance of all sizes of native trout available during the open season in the lake, *we must protect the young trout in the streams.*

The Mackinaw trout (*Christivomer namaycush*) was introduced into Lake Tahoe about fifteen years ago. It has done so well that it now furnishes the very best sport for anglers and even is taken with profit by commercial fishermen. The reason for its success is *not* due to the fact that the Mackinaw has destroyed the other trout, *but* because the Mackinaw has adapted itself to the food conditions in the lake and has found suitable breeding grounds. It has propagated and increased enormously from year to year, until it has become the most numerous of all the trout in the lake.

Recent investigations by the author show that the Mackinaw is entirely a bottom feeder. Its food consists of snails, deep water insect larvae, crustaceans and small fish which also feed on the bottom; such as bullheads, suckers, chubs and some species of minnows. Thus, it is a very efficient agent in working over undesirable species of fish into a very desirable sport fish and a very delicious food fish. Owing to its food habits, this trout is found in the deepest holes in which it is possible for any trout to exist. Hence, fishermen who go after it in these deep holes with several hundred feet of line and the proper tackle, have uniform success in landing big fish. Such fishermen soon reach the limit very quickly and have a good catch of trout weighing from six to fifteen pounds. Every specimen examined by the author, and they have been many, has been a beauty, in perfect physical condition, very fat and with firm flesh.

Only a few years ago the Commission introduced into Lake Tahoe the steelhead trout. This season's fishing alone has demonstrated abundantly that this trout has been a success in the lake. It is found mostly in comparatively shallow water—10 to 50 feet—and is obtained by surface trolling with a light spoon outfit. As a result it furnishes plenty of sport at the opening of the season, and, when the weather will not permit trips to deep water, good catches are often made in shallow, calm water or even from the resort piers.

The breeding season of the steelhead in the lake has been determined as the latter half of June, possibly running into July. Six-pound females, which had just finished spawning, but were still in good physical condition, were not an uncommon catch the latter part of June this season. Fishing for steelhead in the lake should therefore be confined to the first half of June and to September and October.

These investigations prove conclusively that the native and introduced species of trout in the lake have succeeded in segregating and adapting themselves to the existing food conditions in the lake suitable for each respective species. They have also found the proper breeding grounds, and grounds at that, in which they do not interfere with one another. They are therefore living and increasing, each species in its proper environment.

It is the purpose of the Commission to make a thorough study of the food supply and conditions of existence in the lake in general and in every part of it in particular. This is, of course, a work requiring years of study and investigation. From time to time it is hoped that

data may be obtained which will warrant the introduction of other species of fish to the end that good fishing may be had at all times, and at any time, by all classes of sportsmen and for those who do not claim to be sportsmen, but who, as patrons of the Lake Tahoe resorts, like to fish in the lake.

POACHERS AND GAME LAW VIOLATORS.

By Walter R. Welch.

For ages men have been accused of violating the game laws and usually with reason, for love of forbidden sport or dire necessity are strong motives.

In these days when the conservation of our wild life is attracting so much general attention, it is of interest to consider what has been the history of the game laws.

Under the tyrannical game and forest laws introduced by the Norman kings, the punishment for killing the king's deer was the loss of eyes, besides other shameful penalties.

This will easily account for the many banditti which formerly lurked in the royal forests, and which, with their superior skill in archery and knowledge of those unfrequented solitudes, found it no difficult matter to resist or elude the civil power. Among all these, the most famous was Robin Hood.

"In this time (about the year 1190, in the reign of Richard I)," says Stow in his annals, "were many robbers and outlaws, among the which Robin Hood and Little John, renowned thieves, continued in the woods, despoiling and robbing the goods of the rich. They killed none but such as would invade them; or by resistance for their own defense.

"The saide Robert entertained an hundred tall men and good archers with such spoils and thefts as he got, upon whom four hundred (were they ever so strong) durst not give the onset. He suffered no woman to be oppressed, violated, or otherwise molested. Poore men's goods he spared, abundantlie relieving them with that which, by theft, he got from the abbeys and the houses of rich earles, whom Maior (the historian) blameth for his rapine and theft, but of all thieves he affirmeth him to be the prince and the most gentle thiefe."

The personal courage of this celebrated outlaw, his skill in archery, his humanity, and especially his leveling principle of taking from the rich and giving to the poor, rendered him the favorite of the common people.

Although often referred to as the "Prince of Poachers," Robin Hood's memory has been celebrated in innumerable ballads, some of them doubtless dating back to the far-off Norman days, when he held sway in Sherwood Forest, in Nottingham shire, and feasted his followers on the king's fat deer.

Nicholas Rowe, the first editor of Shakespeare (1709), asserts that the latter "had, by a misfortune common enough to most fellows, fallen into ill company, and amongst them some that made frequent practice of deer-stealing, engaged him more than once in robbing a park that belonged to Sir Thomas Lucy, of Charlecote, near Stratford."

The Reverend Richard Davis wrote, about 200 years ago, that Shakespeare "was much given to all unluckiness in stealing venison and rabbits, particularly from Sir Thomas Lucy, who had him often whipped and sometimes imprisoned, and at last made him fly his native country." The young poacher, who had "broken the park, stolen the deer, and kissed the keeper's daughter," is said to have been seized, brought before the indignant magistrate and treated with so much severity by Sir Thomas that he revenged himself on the rural magnate by affixing doggerel verses to the gates of Charlecote.

The wrath of the magistrate is declared to have blazed so high at this additional insolence that Shakespeare was obliged to withdraw himself from more serious prosecution by escaping to London.

Additional embellishments to the tale are that the young poet stole the buck to celebrate his wedding day, and that Queen Elizabeth intervened to protect him from Sir Thomas's fury.

In the fifth year of Elizabeth (1562–1563) it was enacted that if "any person unlawfully entered into any park impaled, or any other several closed with wall, pale or hedge and used for keeping, breeding and cherishing of deer, and wrongfully hunted, took, or killed any deer, he should suffer three months' imprisonment, pay treble damages to the party offended, and find securities for seven years' good behavior."

The modern game laws of England replaced the old forestry laws, under which none but persons of birth or estate were allowed to kill game, and under which game keepers were given the right of search and other legal powers.

The first of the modern English game laws was passed in 1828. It is known as the "Night Poaching Act," and under its provisions the local magistrates are empowered to inflict heavy penalties for the crime of poaching. "Any person who unlawfully takes or destroys any game or rabbit, whether on open or enclosed land, or who shall at night unlawfully enter or be upon land with any gun, net, engine, or other instrument for the purpose of destroying game, is, upon conviction before two magistrates, liable to be committed to jail for a term not exceeding two months with hard labor, and at the expiration of his term of imprisonment may be called upon to find sureties for his not so offending again. For a second offense he may be sent to jail for six months and in default of finding securities for his future behavior, the prisoner may be detained in jail for a further period of twelve months; a third offense is a misdemeanor (*sic* should be felony) and the offender may be sent to penal servitude for a term of not more than seven years. In a case of this kind the accused would be tried at quarter sessions."

In 1832 unreformed parliament decreed a closed time for hares, pheasants, partridges, grouse, heath and moor game, black game and bustards, made trespassing in pursuit of game a criminal offense and established a system of licenses for the killing and selling of game.

Trespassing in the daytime in pursuit of game is, by this act of 1832, made punishable by a fine not exceeding two pounds and costs, and where five or more persons engage in the trespass, each is liable to a fine not exceeding five pounds. By the same law, when a farmer kills game which, in his agreement with the land owner, is reserved by the land owner, he makes himself liable, not for a breach of contract

for which damages can be recovered in a county court, but to criminal proceedings before the magistrate.

The game laws, passed after the parliamentary reform of 1832 and by a House of Commons elected by the people of the middle classes, began with an act which came into force about 1835 and made it a penal offense to take game on the highway at night. This was followed by another act, passed about 1863, which gave power to policemen to search persons whom they had good cause to suspect of coming from any land where they may have been unlawfully in pursuit of game. Under this measure the policemen apply to the magistrate for summons against suspected persons, who, if convicted at petty sessions, are liable to a fine not exceeding five pounds. All game and all implements for snaring and killing game found in possession of these offenders are forfeited under the measure. The county police force act vigorously with the game keepers in preserving game. The police are not supposed to act as game watchers on private lands, but undoubtedly they often act in concert with the game keepers in preventing poachers and in bringing the poachers to the police court.

The ground game law of 1880 was passed to relieve tenant farmers of some of the provisions of the act of 1830.

As the law stood, a farmer might be summoned to the police court for killing a hare on land in his own occupation. Under the act of 1880, "every occupier shall have as incident to and inseparable from his occupation of the land" a right to kill and take the ground game thereon. He now enjoys this right concurrently with the landlord or with the person to whom the landlord has assigned the right to other game, and a tenant can not sign away his right when making terms with the landlord for the occupation of the land.

The granting of licenses to carry a gun and to kill and sell game is in the hands of magistrates and officers of the Inland Reserve Department. The law makes it an offense to buy game from others than persons licensed by the magistrate.

An examination of the laws of the United States shows that deer were the first game sought to be protected.

In South Carolina as early as 1769, and in Vermont in 1797, a law was passed which prescribed a closed season for deer from January to July.

In 1817, Massachusetts protected deer during a similar season, followed by Virginia in 1820. Little other legislation, except in New Jersey in 1846, is found until after 1850, when Missouri, Ohio, Alabama, and California prescribed closed seasons.

In the sixties came Kentucky with protection for does only.

The establishment of seasons during which deer could not be killed, although much shorter than the present day game laws, recognizes the need of protection during the particular time of year when destruction is easiest and during the season of mating and rearing of young.

The lowest penalty for killing deer appears to be named in a North Carolina statute passed in 1854, which provided: "If any person shall kill or destroy any deer running wild in the woods or unfenced grounds, unless on his own lands, by gun or otherwise, between the 20th day of

February and the 15th day of August next succeeding, he shall forfeit and pay for every offense $4.00 to any person who will sue for same."

What has been known as "night hunting," especially with fire or artificial light, has been the subject of prohibitive legislation since an early date, South Carolina having prohibited taking of deer by that means in 1769, and Tennessee in 1774.

Limitations upon a day's bag of game have also been a more or less effectual means of checking the wholesale destruction of game, but such provisions are of later date, most of them having come into the law since 1880.

It is rather surprising to find that the restriction of hunting to residents of the state came into protective legislation at a comparatively early date. In 1846 New Jersey prohibited non-residents from hunting on another's land under penalty of $15.00, and the forfeiture of the offender's gun; while Delaware in 1852 required a non-resident to have a license from the land owner; in 1852, Maine passed a law providing that "all foreign citizens and Indians belonging in the British provinces are hereby prohibited from killing any moose or deer within the limits of this state, and any person violating the provisions of this act shall forfeit all moose and deer hides found in his possession."

Coming to the present day game laws, special comment is uncalled for and general observations impossible. The development, during later years, of legislation looking to game protection, can best be marked by comparison of the revised statutes of any state today and those of 20 or even 10 years ago.

If any one cause can be fixed upon, aside from increase in population, to account for the danger which threatens game and wild life everywhere, it is bringing the fields and forests into almost instant accessibility by means of the automobile. The need today is not more legislation, but greater strictness, shorter open seasons, smaller bag limits, and the setting aside of tracts of land and forest areas, not as parks, but reserved for game with no open season.

These things must, and will, come and doubtless will come speedily.

At the present time, the most important violations of the game laws in California consist of the "bootlegging" of ducks, and "drag-shooting" with automatic shot guns by market hunters, duck shooting at night, the use of "spot lights" in hunting deer at night, and the killing of various species of game birds and animals during the closed season, commonly called "soonering."

As the game laws become more extensive in their scope and more stringent in their provisions, the need of special officers to make them effective will be manifested, as the game laws of the United States are enacted for the benefit of all of the people and not in the interest of any privileged few.

Interesting, indeed, are the early enactments having for their purpose the protection of game.

Under the laws of England, the ownership of the game and the right to hunt same was vested in the sovereign and delegated to his lords and others whom he pleased to favor, with the result that those who violated the game laws were looked upon and referred to as being poachers and were subject to severe punishment.

Under the laws of the United States, the wild game belongs to the people in their collective capacity, and is not subject to private ownership except in so far as the people may elect to make it so, with the result that those who violate the game laws are taking game that belongs to the people.

As the great majority of game law violations in the United States take place on lands that are open to public shooting, the violators of the law are not looked upon and referred to as being "poachers," but as being "game law violators."

CALIFORNIA FISH AND GAME

A publication devoted to the conservation of wild life and published quarterly by the California State Fish and Game Commission.

Sent free to citizens of the State of California. Offered in exchange for ornithological, mammalogical and similar periodicals.

The articles published in CALIFORNIA FISH AND GAME are not copyrighted and may be reproduced in other periodicals, provided due credit is given the California Fish and Game Commission. Editors of newspapers and periodicals are invited to make use of pertinent material.

All material for publication should be sent to H. C. Bryant, Postal Telegraph Bldg., San Francisco, California.

November 5, 1927.

"The preservation of animal and plant life, and of the general beauty of nature, is one of the foremost duties of the men and women of today. It is an imperative duty, because it must be performed at once, for otherwise it will be too late."—Henry Fairfield Osborn.

NEW COMMISSIONERS APPOINTED.

On September 2, 1927, Governor C. C. Young announced that Mr. I. Zellerbach, who has headed the Fish and Game Commission since January, 1926, had been retained on the Board and that two new men had been appointed. Within a week, the new Commission had met and organized, and it was understood that the progressive policies of the past regime are to be continued. Both of the new commissioners are well-known sportsmen of southern California and will bring worthwhile knowledge to their new position.

In announcing the appointments, Governor Young gave out the following statement:

"As members of the Fish and Game Commission, I have this day appointed George B. Clarkson of Los Angeles, Reginald S. Fernald of Santa Barbara and I. Zellerbach of San Francisco.

"Mr. Clarkson and Mr. Fernald are new members of the Commission and were appointed for their very great interest in matters connected with the wild life of the state. Mr. Zellerbach was a member of the former commission and is named in deference to an almost universal demand from sportsmen all over California, who have been impressed with the faithful and intelligent work he has already done toward preserving our fish and game.

"To many of our citizens the Fish and Game Commission is a body of extreme importance. There is a feeling that California has yet much to learn in fostering and conserving her wild life. The hunter and the fisherman are more than willing to pay their license fee if only they can be satisfied that those fees shall all go solely to the intelligent propagation and preservation of our fish and game.

"Accordingly, it is proposed that our new State Department of Natural Resources, with its division of fish and game, shall see to it that more is done in this direction henceforth than ever before. It is pledged to see to it that overhead is reduced to an absolute minimum, and that every dollar contributed by the sportsmen of the state shall be so expended as to build up to the utmost those all-important resources of California."

FOUR-YEAR PROGRAM INAUGURATED.

Owing to the increased license fees for hunting and angling which became partially effective this year and the extra revenue from the deer tag licenses, the Commission has been privileged to initiate the four-year program which it presented to the Legislature at its last session. The features of the first year's program are fundamental to the whole plan and will make for more efficient and effective administration of the state's fish and game.

The addition of thirty new full-time deputies to the Department of Patrol will guarantee greater law enforcement, better law observance and more certain preservation of wild life. Perfection of fish rescue work will make possible the saving of fish stranded in lakes and streams going dry. Completion of the fish planting system, which the patrol department has successfully handled this year, will result in a less wasteful distribution of young fry and assure more sport to anglers throughout the state. Surveying and posting the thirty-four state game refuges will aid greatly in conserving the life in the refuges, as the signs will notify hunters where the pursuit must stop.

A new speed boat for the upper bay region and several knockdown boats with out-board motors to be carried by deputies on their automobiles for use on mountain lakes and streams will make these areas more easily patrolled.

Four new hatcheries will be constructed this fall: one near Bridgeport in Mono County, another on the Kaweah River, one on Cold River in Mendocino County and another on the Kern River. Experimental egg-taking stations will be established on Smith River in Del Norte County and Prairie Creek in Humboldt

County. Two new biologists will be added to the staff and a definite survey plan inaugurated of all streams and lakes in the state. Ponds will be built at the hatcheries to age fish to larger size.

The Bureau of Education will continue to make serious effort to cultivate conservation sentiment in growing and developing minds. Two new full-time lecturers will be engaged to cover the lower grades and the high schools. A complete motion picture equipment has been purchased and many new reels depicting the principal activities of the commission in its work of protection and preservation will be added to the present stock. The reference library, recently established, will be greatly augmented. Material pertaining to wild life conservation will be made available for the first time to the Commission's employees and to the public at large.

The Research Bureau of the Commission will inaugurate studies with a view to a more scientific and thorough knowledge of conditions obtaining in the state in regard to certain kinds of game birds and mammals. A zoologist and pathologist will be added to the staff and laboratory equipment installed. Very soon the Commission will be able to cope thoroughly with all problems of bird and mammal disease.

A new game farm will be built immediately in southern California so that next year the output of pheasants alone should be 20,000.

The cooperative program, in conjunction with the State Board of Health, for investigation of pollution throughout the state will be set on foot. A joint laboratory will be maintained by both departments for the purpose of investigating the kinds of pollution of our streams, lakes and bays with a view to obtaining knowledge on the best methods of controlling them. Added help in the Hydraulic Department will also enable the Commission to complete its survey and force the installation of fish screens and fish ladders where necessary.

DEPARTMENT OF NATURAL RESOURCES.

Conservation does not belong to those engaged in forest protection. It does not belong to those interested in fish and game. It does not belong to those interested in minerals or water supply. Conservation is really a program that includes all natural resources. The wide demand for a unification of the various conservation programs carried on by the state has resulted in the formation of a State Department of Natural Resources. With this unification should come a widening and improved conservation program which will make each department of the state dealing with natural resources work in harmony and with one purpose.

Of particular benefit will be a possible unification of the educational work relative to forest protection and fish and game protection. Heretofore to some it seemed improper to mention forest protection along with fish and game conservation. In the future, under a Department of Natural Resources, it will not only be allowable but necessary. Why should trees and animals be studied apart? They are definitely interrelated. Education is not the possession of one Bureau, but it is the most important conservation method. It should be used by all interests which have to do with natural resources.

"*Popular education in natural history affords a foundation for the intelligent demonstration of all natural resources.*"

This has been the aim in the summer resort educational work carried on for many years by the Fish and Game Commission. It has borne worthwhile results; it will bear greater results in the future.

SURVEY OF GAME REFUGE BOUNDARIES PLANNED.

California possesses as fine game refuges as are to be found in any state. Some of them are very large; most of them constitute valuable breeding areas for game birds and mammals. The boundaries of these refuges have been defined by law, and mapped. They have been partially posted. However, there has been continued complaint from hunters that the boundaries are not well defined and are not properly posted so that a man does not know when he leaves open hunting ground and enters a game refuge. The need, therefore, for a survey which will definitely mark boundaries and for complete posting of them is obvious. It is with pleasure that the Division of Fish and Game reports that a surveying party is now in the field which will definitely locate the boundary of every game refuge and make suitable maps of each. The same party will see to it that the boundaries are properly posted.

DEER KILL, SEASON 1927.

At least 1200 deer were killed on the first day of the 1927 season, according to the information received by the Division of Fish and Game from the duplicate deer tags received from the hunters themselves.

Duplicate tags show that two hunters killed deer at 5 o'clock on the opening day. The biggest buck of the day was a

seven pointer that Paul Bianchi, Jr., of Gonzales, killed at Eva's Flat, west of Gonzales, in Monterey County. The next largest was a five pointer killed at 6.50 in the morning by Earl T. Dayton at Duncan Mills in Sonoma County.

The total kill in the coast counties reported by August 30 was 4924. This real check on the deer kill thus far does not radically change the old estimates of previous years of the total kill for the state. However, the figures will now be dependable.

Under the new deer law it is possible in California to secure information not available in any other state, and the first day's mail brought to the commission's office data that have already proved the new law to be invaluable. By knowing the number taken in various parts of the state, better conservation measures can be instituted.

Returns are incomplete but on October 1st about 14,000 tags had been received. At that time, the largest number killed was reported from Mendocino County, 1406; 864 from Lake County; 710 from Sonoma.

Tabulation of the figures is so arranged that instant comparison can be made on the basis of district, county or day. Weekend totals are quite evident, fewer deer being killed during the middle of each week. Except for the end of the season rush the first days of the season show largest totals.

During the month of September the first returns on deer killed in Del Norte, Humboldt and Siskiyou counties (District 1½) began to arrive, but tabulation was still incomplete when this was written.

AN UNAPPRECIATED NATURAL RESOURCE.

The role that fur-bearing mammals have played in the history and development of America is indeed remarkable. Due to the rivalry of the fur-trading companies, some of them amounting to imperial organizations, the continent was explored and outposts of civilization flung out into the wilderness. Many fortunes were amassed and the wealth acquired in the traffic of furs equaled that of the fabled mines of Peru.

Lack of foresight and want of appreciation of the worth of this natural resource has resulted in its sad dissipation. Yet even now, with only a remnant left of the once rich and varied stock of fur-bearers with which California was

FIG. 64. Sculling the sloughs for wild ducks in the Suisun marshes. Up with the flood tide and back with the ebb. Photograph by W. W. Richards.

originally endowed, the trappers' take nets a tidy sum. The estimated value of the commercial trappers' catch last year is $258,000. If this sum be considered as interest at four per cent, then six and one-half million is the representative principal and the value of fur-bearers to the state.

Assuredly such an asset should be made permanent by wise conservation. California would then be able to count on a yearly revenue of a quarter of a million dollars which would otherwise not pour into its coffers.

THE VALUE OF THE TRAPPERS' CATCH.

All trappers are expected to report their catch. Because of this fact it has been possible to compile the following figures which show that the trappers still reap a valuable harvest of fur in California.

Species	Estimated No. 1924-25	1925-26
Skunk	29,092	28,107
Raccoon	11,006	13,358
Gray fox	8,301	8,878
Coyote	8,043	8,509
Wild cat	5,443	6,087
Civet cat	3,364	4,292
Beaver	-----	4,019
Muskrat	3,120	6,207
Mink	3,066	3,394
Ringtail cat	2,304	2,698
Kit fox	1,261	272
Marten	1,086	472
Badger	457	496
Opossum	356	613
Weasel	338	227
Bear	227	292
River otter	142	141
Fisher	68	30
Mountain lion	65	75
Red fox	45	18
Wolverine	3	-----
Totals	77,787	88,185

Species	Average price 1924-25	1925-26
Skunk	$1.265	$1.406
Raccoon	3.28	4.392
Gray fox	1.852	1.928
Coyote	4.412	4.048
Wild cat	2.24	2.047
Civet cat	.476	.68
Beaver	----	12.366
Muskrat	.463	.633
Mink	4.635	5.548
Ringtail cat	2.018	2.414
Kit fox	1.949	2.035
Marten	10.677	11.108
Badger	1.578	1.723
Opossum	.634	1.038
Weasel	.792	.742
Bear	8.50	6.92
River otter	12.26	13.446
Fisher	36.784	25.124
Mountain lion	15.80	14.071
Red fox	18.583	14.859
Wolverine	10.00	-----

Species	Estimated value 1924-25	1925-26
Skunk	$36,721 65	$39,517 29
Raccoon	36,099 88	58,667 82
Gray fox	15,373 45	17,117 15
Coyote	35,485 72	34,447 52
Wild cat	12,192 32	12,460 52
Civet cat	1,601 26	2,918 37
Beaver	----------	49,698 95
Muskrat	1,444 56	3,929 03
Mink	14,310 91	18,829 77
Ringtail cat	4,649 47	6,512 34
Kit fox	2,457 69	553 52
Marten	11,599 70	5,244 97
Badger	720 15	854 61
Opossum	225 70	642 29
Weasel	267 70	168 43
Bear	1,929 50	2,018 76
River otter	1,740 92	2,051 01
Fisher	2,501 31	755 61
Mountain lion	1,027 00	1,055 33
Red fox	836 24	268 13
Wolverine	30 00	----------
Totals	$181,215 13	$257,711 42

	1924-25	1925-26
Number of trapping licenses issued	2,984	3,530
Number of trappers reporting	1,933	2,338
Per cent reporting	64.8%	66.5%

Two changes in the trapping laws became effective on July 29, 1927. The trapping season now opens on November 15th instead of October 15th. This change stops the taking of many unprime furs which have but little market value, and materially increases the returns of most trappers. The other change in the law adds kit fox, beaver and muskrat to the list of fur-bearers and gives necessary protection to these animals.

GAME MANAGEMENT.

Even those who do not keep track of developments in forestry are conversant with the term "forest management." It has only been recently, however, that the term "game management" has appeared in conservation literature. Historically, the attitude on game conservation has developed about as follows:

1. Profligate expenditure of natural resources.
2. Rumors of depletion.
3. Public awakening to needs of the future.
4. Scientific utilization of natural resources.

Naturally the term "game management" fits in with this last development.

A recent editorial in *American Forests and Forest Life* attempts to point out that in planning game management choice must be made of three projects:

1. Restore herds of former days.
2. Save a few at which to look.

3. Find a profitable way of utilizing the surplus.

We are not so sure that it is a matter of choice of one or the other of these projects; rather it is the inclusion of all three projects plus several others. All three projects are worthwhile. It seems more reasonable that we should have a few big game animals saved to look at. Visitors to national parks usually gain a greater thrill from the sight of a wild deer or bear than from the scenery that surrounds them. At the same time there are certain areas that should be employed as propagation grounds for animals with the direct view to utilizing the surplus. In attempting the third project we might very well look to the first one, the actual restoration in certain areas of former numbers. This might mean restriction of grazing, furnishing of better food supply and other useful means looking toward an increase.

Game management is an inclusive term. No one yet has given us a definite outline of the main lines of attack to be used by anyone who might call himself a game manager. The term will continue to be rather intangible until something concrete is suggested. Within the next few years there will be forthcoming the aims, the methods and the means which will make this new term, "game management," more understandable.

HATCHERIES TO SERVE FULL TIME.

One of the plans for the coming year includes the continual use of a number of the state's hatcheries. The importation of European trout and others from the eastern United States brought to California species which deposit their eggs in the fall rather than in the spring, as do the native trouts. It seems a feasible plan, instead of closing some of the smaller hatcheries for several months each winter, to have shipped to them eggs of fall spawning trout. The resultant fish will be of size sufficient to place in holding tanks by the time shipments of rainbow and other spring spawners are obtained. Some of the hatcheries are so situated that they can not be operated in midwinter, but in other instances this plan seems feasible and will be tried out. This is the plan projected for the Yosemite Hatchery and, accordingly, winter visitors to Yosemite will have an opportunity to see the hatchery in full operation.

MOUNTAIN LION CONTROL

State lion hunter, Jay Bruce, has now a total of 315 mountain lion scalps to his credit. Last year he bettered his average by taking 36, the largest number yet secured in a single year. By September 1st of this year he had secured 31. He accounts for the better record this year as being due to a camp helper who has enabled him to spend more time actually on the hunt. The past spring was spent in San Diego and Ventura counties. In San Diego County four were secured, whereas six fell to his prowess in Ventura County. All of this was accomplished in spite of trouble with sick and injured dogs. At the present time his dogs are in fine working condition and several younger animals are being trained.

Mr. Bruce is considering an enticing offer to try his prowess in securing maneating tigers and other large cats in the Orient. Such an expedition as is planned would take Mr. Bruce from his work temporarily, but would increase his knowledge and ability at trailing and killing the most noted among predatory species.

SUMMER RESORT EDUCATIONAL WORK.

As in past years the Division of Fish and Game has cooperated with the National Park Service in a nature educational program in Yosemite National Park. There are three outstanding features of the work: Lectures are given nightly at various resorts, a school designed to train nature guides and teachers of natural history, holds a seven-weeks' session and thousands are led afield on field trips to study nature first hand. The final reports show a trebling in attendance on the field trips, which is the more unique and important feature of the work, and are as follows:

YOSEMITE NATURE GUIDE SERVICE, EIGHTH SEASON, 1927.

Lectures—	Number	Attendance
Camp Curry	34	48,200
Yosemite Lodge	23	11,050
Museum Campfire	6	543
Special lectures	11	2,560
Geology at Museum	254	11,300
Glacier Point	88	8,258
Yosemite Hatchery	128	18,000
Totals	544	99,911
Field Trips—		
Camp Curry (adults)	149	3,586
Camp Curry (children)	55	735
Yosemite Lodge	104	1,727
All day	23	837
Glacier Point	48	522
Special	45	1,301
High country	7	221
Totals	431	8,929

A staff of eight men was employed by the National Park Service to give aid along the lines indicated. A special fea-

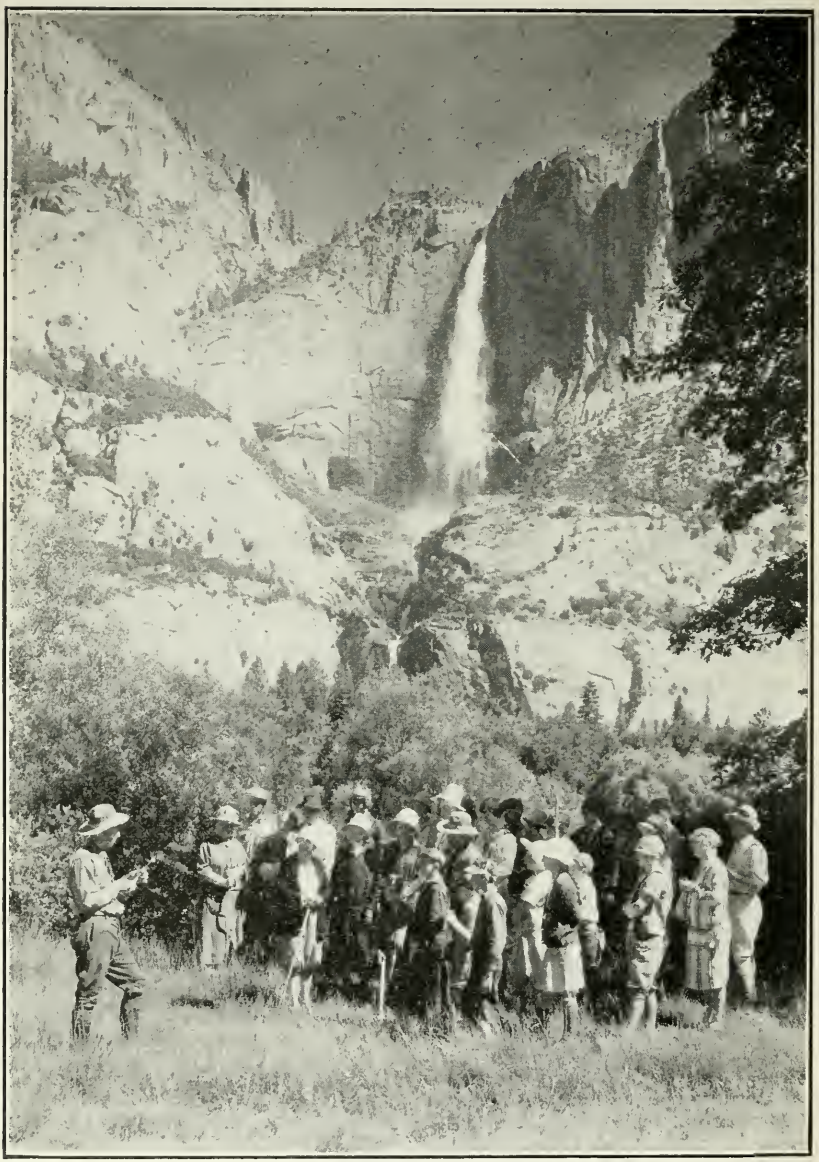


FIG. 65. In the act of making conservationists out of summer vacationists. A nature guide party in the field in Yosemite Valley where more than 10,000 receive instruction along conservation lines through the study of living things—not printed words. Photograph by George Stone.

ture of the work during the past summer included the development of a children's story hour and of children's field trips. After six weeks of study on the floor of the valley, students of the School of Field Natural History spent a week making studies at timber line. Requests for an opportunity to return and continue their studies leads to the conclusion that they found the work very worthwhile. From a conservation viewpoint no more important work could be done than to train a group of teachers and send them out to different parts of the state.

SAFETY FOR PHEASANTS.

Owners of land stocked with pheasants are showing an interest in the permanent establishment of this fine game bird in the fields of the state. Many farmers in areas given over to alfalfa and grain crops, on discovering pheasants nesting in their fields, have protected the birds. Some have refrained from cutting the area immediately surrounding the nest; others have set up markers and endeavored to disturb natural conditions as little as possible when harvesting their crops; still others, who were unable to do this, have gained permission to hatch the pheasant eggs under domestic hens. By means of such cooperation splendid results will attend the attempt to introduce the pheasant in California.

Another aid in the protection of the bird comes in the posting of land on which pheasants have been liberated. Accordingly, planting sites are being signed with warnings as follows:

WARNING

California Fish and Game Commission has stocked these grounds with pheasants and other game birds.

NO TRESPASSING, HUNTING OR SHOOTING.

No dogs allowed on these premises. Violators will be prosecuted under Section 627 of the Penal Code of the State of California. Obey the law, avoid the penalty and protect fish and game.

PHEASANTS A BENEFIT.

Many reports praising the work done by Chinese ring-necked pheasants in the cleaning up of bugs and insects in the agricultural areas in which they have been planted have reached the Commission. A number of the farmers on whose places pheasants have been planted are enthusiastic over their presence as they do not damage grain or garden truck, but do keep up a constant attack on destructive insects.

It is interesting to note also that reports from other states confirm the often expressed opinion that in addition to being a fine game bird the pheasant is a boon to the agriculturist.

W. E. Albert, State Game Warden of Iowa, has recently contributed an article on these birds to *American Game*, the official bulletin of the American Game Protective Association. Albert praises the birds and declares that he has proven conclusively that the pheasants planted in Iowa do not attack standing corn but do get the cut worms that are a menace to this great Iowa crop. The crops of a number of pheasants were examined and found to contain plenty of noxious insects, worms and grubs of a destructive nature.

The American Field has the following illuminating article on the Chinese ring-neck in its issue of May 7th:

"Chinese or ring-necked pheasants will be plentiful in the Finger Lakes region of central New York next fall if the report made by Hon. C. S. Wilson, former Secretary of Agriculture for New York state, may be taken as an indication of pheasant conditions for the next open season. Mr. Wilson's report was made on March 3, after a careful survey over his own extensive apple orchards and other sections of the Finger Lakes region. In concluding his report Mr. Wilson writes as follows: 'I ate breakfast with a cock pheasant this morning, and this is literally true, for as I was eating my breakfast a fine cock pheasant was strutting around just outside the window, not ten feet from the house, and from time to time he would stop to eat the corn thrown out for him. One day there were over 30 pheasants in our yard at one time. We like to have plenty of pheasants on our farms, because they consume a great quantity of injurious insects and bugs, and how they do clean out the grasshoppers!'"

THE NEW SALMON LAW.

The new salmon law was found defective and difficult to enforce, consequently a recent court decision upholding the present salmon law has been encouraging to the administrators of fishery work in California. Certain salmon fishermen in San Francisco Bay brought salmon from beyond the three-mile limit into District 10 where it is illegal to have fresh salmon in possession during the closed season. It was shown that the legislature in planning the law took

into consideration the migratory movements of the salmon. The closed seasons on the outside salmon controlling districts are designed to prevent fishermen from catching too great a proportion of immature fish, thus causing a great waste. Salmon in California are rapidly diminishing in numbers, due to inadequate protection, and this court victory will help to give this fish a fair chance to survive.

A NEW BIRD BOOK.

Bird students have waited long for a small, handy volume which would help them identify birds in the field. The one long used emphasizes the description of museum specimens rather than field characters and contains no colored plates. The publication of a four-volume, illustrated monograph has not lessened the demand for a handbook. But bird students may now rejoice in the filling of their need. "Birds of the Pacific States" (Houghton Mifflin, Boston; XIX, 353 pp., 9 colored pls., many figs. in text), by Ralph Hoffmann, will be chosen as a boon companion of every field student of birds. The author won his reputation on the publication of a handbook on the birds of New England and eastern New York. The present volume, written after seven years of work on the Pacific coast is just as usable and dependable. The nine colored plates and numerous line drawings are by Major Allen Brooks, the artist guaranteeing accuracy and beauty. The printer's art is less praiseworthy for color blending could be better.

It takes a thorough field student of birds to write a book for field students and those who have been afield with this author respect his abilities as a naturalist. Built on his own field observations, the book is what the author sought for it, readable and accurate.

Students of birds are in the habit of finding the thrushes at the very end of a bird book, but Mr. Hoffmann follows the new order to be used in the forthcoming Check List of North American Birds and places the sparrows at the end. Full biographies are impossible in a handbook so each write-up consists of a general word picture of the bird in the open, the characteristic haunts, habits and behavior which serve best to identify it. The most prominent field marks are emphasized by the use of italics. Admittedly printed words can give but a poor idea of the song of birds, yet the descriptions are useful and help to differentiate between various species. Subspecies are lumped together as they should be for the beginning student.

To everyone seeking a ready source of dependable information when stirred by the sight of an unusual bird seen in the open, this new book is highly recommended. It should find a place in many an automobile door pocket where it can be referred to "on the spot."—H. C. Bryant.

HAWK BULLETIN AVAILABLE TO TEACHERS.

A splendid booklet illustrated in color, entitled: "A Plea for Our Hawks," is being sent to teachers on application. Originally published in Nature Magazine, the booklet was arranged by the American Nature Association and a stock made available through purchase and through the generosity of the association. It is teaching material of high order.

FISHERIES STATISTICS FURNISH BASIS FOR LEGISLATION.

More and more the usefulness of the state's system of handling fisheries' statistics is coming to the fore. During the legislative session the continual complaint of the scarcity of striped bass caught by anglers led to a concerted effort on the part of sportsmen's clubs to prohibit all commercial fishing and sale of striped bass for a period of three months in each year. Another bill closed certain additional portions of the fishing grounds to commercial fishing. In defense of the first bill it was shown that the general trend of the total catch by years was downward. This was considered as conclusive evidence of depletion of the supply. The Department of Commercial Fisheries gathered the records of the catch in each boat for each day of fishing throughout the year, using twenty boats as a unit. Employing this more dependable method of showing the actual catch, it was found that the average catch per boat, per day's fishing, rose from 114 pounds in 1920 to 175 pounds in 1923, dropping to 124 pounds in 1924 and rising to 171 pounds in 1925. Thus it was shown that the figures of total catch were really of little value as an indicator of the evidence of fishing. The trend of the boat catch has been distinctly upward, indicating that the fishing is in a healthy condition. The decreasing total catch can readily be explained on the basis of diminished rainfall and the greater abundance of salmon which attracted the same fishing boats. The presentation of this evidence was sufficient to defeat the more radical bill and preserved to the commercial fishermen rights to which he is entitled. Guesswork and opinion can not compete with dependable statistics.

PHOTOGRAPHIC EVIDENCE.

Sometimes it takes only a photograph to convict a violator of the fish and game laws. Recently a Riverbank youth was so proud of a bunch of young ducks killed out of season that he had himself photographed with the game strung around his neck.

The photographer who was given the job of printing the pictures, mentioned the fact to a friend, who figured it would be a good thing for Deputy G. W. Magladry of Modesto to know. The game warden called upon the photographer and secured a print of the young nimrod and his illegal kill. He called upon him and when the boy denied that he had been shooting ducks, Magladry flashed the photo. This broke the youth's haughty spirit and he confessed that he had killed the birds. He asked the warden if cottontails were out of season and when informed that they were, admitted he had been shooting them also.

Taken into the justice court of Judge W. H. Rice at Modesto, he entered a plea of guilty and after being questioned by the judge regarding his age was held to the juvenile court, as he was but 17. Superior Judge L. W. Fulkerth placed the boy on probation until he reaches the age of 21. He took the young man's gun and he will not be allowed to hunt during his probation. Meanwhile he must report to the judge at regular intervals.

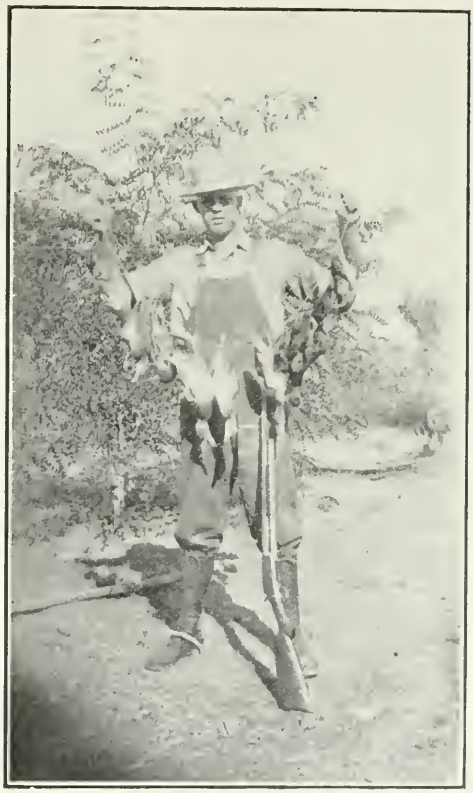


FIG. 66. A photograph that led to an arrest and conviction.

The stern handling of such a case makes a conservationist of the boy and is a reminder to all that game laws have a purpose and must be observed.

DEER LICKS.

It is a well known fact that deer travel many miles to utilize salt licks. The term, of course, applies to springs and

other areas where salts of various kinds are found in sufficient quantity to attract deer. Mr. Smith Riley of Long Island, New York, has interested himself in trying to answer the question of what salts afforded by these licks are necessary to the life of the deer, thus making them an attraction. Recently he had twelve analyses made from various salt licks. In most instances more than a half dozen different compounds were present in the soils from alkali licks. In each instance, the percentage of sodium was largest, with chlorine taking third place. Inquiry showed that no information was available from animal industry men relative to domestic animals, though it was suggested that sodium and chlorine are the two elements supplied by salts most likely to be lacking in the food of the deer. Phosphoric acid and calcium, also necessary to the well-being of the animals, are usually obtained in sufficient quantities from the herbage on which they feed.

This simply opens up the question as to the real attraction to be found in a salt lick. If any one has any contribution to the subject we hope he will communicate with Mr. Riley.

PERSONNEL FILE IMPROVED.

Every employee of the Fish and Game Commission was recently furnished a blank requesting information as to training and ambition. Similar blanks have always been filed with the Civil Service Commission but the time has come when a similar file is necessary within the organization in order to handle promotions more advantageously. The larger an organization grows the more necessary it is to have the personnel well fitted for the various positions. This is a fine start in the right direction.

STATE FAIR EXHIBIT.

The message of conservation, protection and propagation of fish and game in California was given in a forcible manner through the medium of attractive exhibits to those who visited the State Fair at Sacramento, September third to tenth.

In addition to the comprehensive and illuminating exhibits of fish and game birds shown last year, a third exhibit showed the need for awakened interest in protection of wild life. This exhibit known as the "Forest Tragedy" was arranged by Captain Walter B. Sellmer.

Captain Sellmer's exhibit showed a beautiful spot in the forest, with a fallen doe and her two orphaned fawns, left to battle the elements without a mother's protection. The scene is being viewed with a sorrowful eye by a hunter who has happened upon the wantonly and illegally slaughtered doe, while in search of game. With its natural setting, with every detail worked out, the exhibit should have a restraining effect upon every hunter who shoots first and looks afterwards, or who deliberately violates the law to shoot a defenseless doe. This exhibit was first shown at the Marin County Fair last year at San Rafael where it excited much favorable comment. It was later shown at Palo Alto and aroused much interest there also. It is the intention of the Division of Fish and Game to turn this into a traveling exhibit to be shown throughout the state.

The exhibit of the Fish Culture Department this year was even more comprehensive than in previous years. Against a scenic background were shown all of the fish that frequent California waters. Troughs filled with fish from the state hatcheries and aquaria giving close-ups of the many denizens of streams and other waters of the state were given a prominent place. It was possible to trace the growth of trout from the small fry to the point where they really excite the interest of the angler.

Under the direction of August Bade an exhibit of all the birds being propagated at the State Game Farm near Yountville was shown. Superintendent Bade's display portrayed methods used in bringing the birds to the liberation stage and attendants were ready at all times to explain how the birds are hatched, fed and cared for in captivity so that they do not realize they are not in the wild state.

HOME GROWN DUCKS PLENTIFUL.

It should be good news to disappointed duck hunters of last season to hear that a fine group of home grown ducks were available when the duck season opened. The augmented water supply of last winter increased the breeding grounds for ducks a hundred fold. Several lakes, the bottoms of which have been used for agriculture for several years past, were flooded by spring freshets. In some instanees, rising water destroyed the first nests but reports are to the effect that most of these ducks nested a second time. Tulare Lake and Buena Vista Lake, at the southern end of the San Joaquin Valley, contained sufficient water this past spring and summer to attract numerous ducks. Goose Lake in the northeast corner of the state afforded another fine breeding area.

NEW FILMS OF STATE GAME FARM SECURED.

During the month of August, a splendid series of motion picture films were obtained at the State Game Farm. At least three reels forming a feature picture will be available as soon as they are completely titled. A complete series showing the ring-necked pheasant from the egg to the adult bird and the planting was obtained. Although these reels will not be available for loan they will be shown in connection with lectures at schools, fish and game protective associations and service clubs.

THE SHAD IN OREGON.

The first shad to be introduced in the waters of the Pacific coast system were planted in the Sacramento River by the U. S. Bureau of Fisheries in the early eighties. Conditions were most propitious for the survival of this famous eastern fish and it soon multiplied in numbers sufficient to spread throughout the Sacramento River system. In a few years the other streams of California became stocked with shad and it was not long before its appearance was noted in Oregon waters.

During the season of 1926 more than 1,500,000 pounds of shad were taken from the Columbia River. This is positive proof of the success the shad has had in adapting itself to northern conditions. It further discloses the fact that the shad is of very real commercial value to the Oregon fishing industry.

"Shad," states *The Oregon Sportsman* (Vol. 3, No. 5) "are native to the streams of the Atlantic coast. For many years they were caught in very large numbers in those streams and while the demand was always good the catch was large without restriction and the price was low until the last few years. Now, however, the purity of eastern streams has been destroyed by industrial wastes and city pollution to such an extent that the run of shad has almost entirely disappeared. This is notably true in the case of the Hudson, formerly probably the most famous of all shad streams in the United States. As a result, shad have become so scarce in the eastern market as to constitute a delicacy. Served in the cafes and restaurants the flesh of this fish is considered a choice morsel and commands a large price in all the markets."

Now the eastern states obtain the greater amount of their supply of fresh shad from California. Last year over 50 carloads of iced shad were expressed east from San Francisco. Thus far California has enjoyed a monopoly on this feature of the industry, for the reason that the Oregon operators have canned all their catch.

DEER VIOLATOR APPREHENDED.

The inclination to destroy life is still a more potent urge in the minds of some than the intelligent application of the laws calculated to conserve the mother stock of game and the newly born. Hunters can yet be found who have no genuine sentiment for protected life. They shoot whatever has breath and harbor no desire to leave something for future generations.

Evidently the hunter who was recently apprehended by Deputy Theodore Benson in Humboldt County for killing a doe, a fawn and a spiked buck was a representative of this class who can see no value in the laws protecting game. He probably never reviewed the present in the future; never considered that game belongs as much to those that are to come after them as it does to those now living. He probably saw no importance in the law that would conserve an abundance of deer by protecting the does, their young and those young bucks that have yet to learn to be wary of the hunter.

Deputy Benson was informed that this "so-called sportsman" was likely to violate the deer law and apprehended him as he rode into camp with a fawn on his horse, followed by a woman carrying a doe on her saddle. When caught redhanded the violator tossed the carcass of the fawn into a gulch, leveled his gun at the deputy and then thought better of the matter. When brought before Judge Robertson of Fortuna he was sentenced to serve 100 days in jail or pay $200. Needless to relate, the ideas that this violator now entertains about the laws for the protection of game are less vague and indefinite.

SCOUT SERVICE TO WILD LIFE.

The Permanent Wild Life Protection Fund, through Dr. William T. Hornaday, Trustee, and also former director of the New York Zoological Park, awards a gold medal to any member of the Boy Scout organization who shall during a given year demonstrate to the National Court of Honor that he has rendered valuable service of a quality satisfactory to the court in the conservation of wild life.

Valuable services to wild life may be rendered in the following ways:

1. By actively supporting laws and law officers for the protection of birds, quadrupeds, and fishes. Report immediately

to game wardens or policemen all violations of wild life protective laws, make formal complaints against violators, and give testimony at the trials. In this every father or big brother should back up the scouts.

2. By securing the support of members of legislatures and Congress for bills intended to enact better protective laws. Boy scouts can wield immense influence in this direction if they will! Combined effort is the key to success.

3. By securing the support of schools, or forming clubs, for the protection and increase of wild life.

4. By preventing, or punishing, nest robbing and song-bird killing by boys who have not been taught to protect wild life.

5. By addressing schools in behalf of wild life protection, and writing school essays on the rights of birds, the value of birds to man, the duty of boys to protect them, and the methods to be adopted.

6. By securing five-year close seasons for species of birds or quadrupeds that are locally becoming extinct.

7. By encouraging farmers to "post" their farms against all shooting.

8. By helping post notices of new protective laws.

9. By establishing bird sanctuaries.

—*Wild Life and Conservation.*

A NOVEL TYPE OF DUCK REFUGE.

Everywhere throughout the United States are duck grounds that are "shot out." These areas are idle and are serving no purpose either in supporting or raising ducks. Duck hunting enthusiasts are inclined to look on them with mingled feelings of regret and disappointment and sadly to recall memories when they were haunted by teeming numbers of migratory wildfowl.

However, there is little need for such pessimism. New Mexico has solved the problem of making the sport of duck shooting perpetual by means of a unique system of refuges. Along some 125 miles of the Rio Grande extends a series of sanctuaries alternating with public shooting grounds. In these protected areas the ducks take refuge when relentlessly bombarded by hunters in the course of their flights up or down the river. Here they are unmolested and find rest and food. Others that would otherwise continue on their journeys are induced to join them. Thus, by means of this unique system ducks are attracted and held in an area that would be barren of their presence without it.

"There is very little doubt" writes Aldo Leopold in *American Forests and Forest Life* (Vol. 32, No. 389), "that ducks would have been largely 'burned out' of the middle Rio Grande Valley by this time, but for the protection offered by the refuges. They would go right on through to Mexico, and instead of several months of shooting, the local sportsmen would enjoy only a few days of shooting during the main flights."

In summing up the efficacy of the system, Leopold says, "The local hunter is benefited because he has a place to shoot and at least a chance for something to shoot at. If he is a club member, he gets a chance at the birds which tend to 'trade' from the refuge to his club. If he is not a club member, he gets a chance at the birds trading between the refuges on the river or between them and the other public grounds.

"The general public is benefited because a whole river valley has been kept out of the class of idle 'burned-out' land, and kept in the class of usable winter range for waterfowl. Also, the number of local breeding ducks has been greatly increased, and thus made to contribute to both the local shooting and that of other points south."

PUBLIC SHOOTING GROUNDS SUGGESTED.

My idea of a sportsman is one who is willing to give a square deal to everyone, including the game hunted. Is it unsportsmanlike, I wonder, for the owner of land, who derives his living from the soil on which he pays taxes, to deny to others the right of enjoying it temporarily? Most of those who own offices or homes in the cities would be unwilling to let a rancher enter on their property and commit an act against their wishes. I am a land-owner and have had my house peppered with shot, my stock killed, my fences pulled down. I have suffered damage from fires started by hunters and at times have been brought to the point of looking with disapproval upon the unsportsmanlike character of those who are careless or disregardful of the rights of the land-owner.

However, I realize the genuine pleasure afforded to a vast lot of men who go hunting. With the increase of automobiles that take the city sportsmen out into the country, the problem grows every day. Certainly a solution might result if the state would furnish these landless hunting enthusiasts with places on which to hunt. Big tracts of land could be purchased in the different counties, game refuges established on them, and a charge

made for their cost and maintenance in the form of a license. In this way the landless chap could be satisfied and the rights of the land-owner less open to infringement.—H. E. Ellery, Oceanside, California.

FLOATING REDUCTION FACTORIES.

(Vol. II, No. 311.)

According to *Science Service*, "The most novel development in floating fish factories is that of the 'Calgary,' a French vessel of over 2600 tons. This vessel is being provided with powerful refrigeration equipment and three large cold storage compartments with a capacity of 800 tons of fish. There are six retorts on board. One will be used for cooking lobsters and crayfish; another for making gelatin; two, capable of handling 40 tons of fish and fish waste per 24 hours for conversion into oil and fertilizer; and two others with a capacity of five tons each for the steam extraction of oil from the livers of sharks and rays. There are two oil storage tanks, one of 26,000-gallon capacity for storing fish oil and one of nearly 400 gallons for liver oil. Although it is proposed to operate the vessel off the west coast of Africa it has been suggested that the vessel may visit Iceland, Greenland and even North Atlantic fishing banks adjacent to our own coasts.

"The power of science in making far distant resources available is well illustrated by these developments. Unless subjected to proper international control, these same developments may encompass the ruination of important aquatic resources and leave us poorer than before.

"The menace still remains, and unless some form of international cooperation is evolved we may have another 'rum row' off our coasts busily engaged in mopping up the fish supply with utter disregard of the needs for conservation and bootlegging the manufactured products into any port where they can find safe entry.

"California authorities have constantly striven to restrict the amount of sardines —so abundant off their coast—which shall be used by the reduction plants for conversion into oil and meal. This has been done so that the great sardine canning industry may * * * become a per-

FIG. 67. Basketful of young ring-necked pheasants just out of the incubator. State Game Farm, July 17, 1927. Photograph by Sidney Snow.

manent state industry, which is now producing more than a million cases of canned sardines per annum."

A BRIEF FOR THE CORMORANT.

The ill feeling that fishermen bear toward the cormorant springs from the belief that the bird is responsible for the scarcity of fishes. Fishermen and anglers have witnessed scenes in which the cormorants have caught fish and have made a sweeping condemnation of the whole family. But this prejudice is due to lack of discrimination and understanding. As is usual in such cases, investigation and careful examination of the inter-related circumstances prove that the cormorants are unjustly blamed.

"Cormorants are among the best friends of our fishes," writes Arthur H. E. Mattingley in the recent July-August *Condor*. In fact, "they assist in keeping up a supply of fishes," he asserts, "for the use of man." Nor has the cormorant such a "voracious appetite, as some persons suggest when they condemn the bird."

In proving his case, Mr. Mattingley continues as follows: "Most of our fresh water fishes spawn in places where there is some cover or protection for their ova, which is usually deposited among the vegetation in swamps or back-waters, where there is a gentle current flowing or rather filtering through, or in streams among the water weed and other aquatic growths that prevent it being swept away into the swifter parts of the current; also the ova may be placed under logs and stones. On account of the immobility of the ova, it is readily preyed upon from below by many kinds of crustaceans, such as yabbies (crayfish), while water tortoise and eels and other fishes dispose of vast quantities of it as well as myriads of the small and almost helpless fish fry. Statistics collected by expert pisciculturalists and ichthyologists indicate an astounding mortality among the fish ova and fish fry, to an extent almost incredible. The small number of fish that arrive at maturity is out of all proportion to the number of ova deposited. This dire mortality is due to the enemies of the ova and fry, and, if the enemies are not held in check, then there is a serious diminution in the available supply of mature fish. To destroy those creatures that prey upon the enemies of the fish ova and fry is tantamount to destroying the fish themselves, and in the destruction of the cormorants this procedure is exemplified.

"Special observations made by me at the cormorant rookeries situated on inland waters show that they feed their young almost entirely on yabbies (crayfish), frogs, shrimps and young water tortoise. One must remember that at this period the swamps, particularly in the Murray River basin, the greatest waterway in Australia, are annually inundated, and what is dry land for part of the year is then covered with water. It is at this period that the large and mature fishes retire from the main stream and deposit their ova among the aquatic vegetation of the swamps. Crustaceans of many kinds repair also to the swamps at this time, and prey upon the ova and minute fry in appalling manner, billions of either fishes' eggs or young fishes disappearing into their hungry maws. Water tortoise likewise lay their eggs in the sand adjacent to the swamps, so that their young, when hatched out by the solar heat, can readily find their way to them and banquet upon the bounteous supply of fish eggs and fry.

"It is precisely at this period that certain species of cormorants, namely, *Phalacrocorax ater*, *P. fuscescens* and *P. carbo*, nest together in rookeries in these swamps, well knowing that an abundant harvest of crustaceans is to be reaped from them at this time. The instinctive knowledge of this fact is a necessity to them, since their energies are taxed to their utmost to satisfy the voracious appetites of their young ones. At this period there are no fish of suitable size, such as is commonly captured by cormorants, to be found in the swamps; with very few exceptions, only the large spawning adults are to be found. It is obvious that the destruction of fishes by cormorants in these localities does not occur at the nesting period, cormorants disdaining the capture of the small fry when there is a plenteous supply of larger size and more readily captured, slow-moving forms of life suitable as food for their young ones. Hence the cormorants at this period allow more fish to be hatched out than are eaten by the adult birds throughout the balance of the year, when they prey upon them in their more advanced stages of growth, and when the fishes have a better chance to escape.

"Owing to the small size of the ova of fish, a crayfish can easily dispose of 1000 of them each day, and if we take the spawning season, that is, the period that spawn is available, as thirty days, we have a total of 30,000 of potential fishes destroyed by one crayfish in a season. If we again take into consideration the fact that a cormorant captures ten of these crayfish for each of the thirty days, we have the enormous credit to the cormorant's account of 300,000 ova that have

the chance of hatching. Now if we take the quantity of fish a cormorant could devour daily as six and multiply it by 365 days of the year, we find that a cormorant could dispose of only 2190 fish per annum. The total yearly credit in favor of the cormorant is thus 297,810 fishes: truly a splendid credit balance! It is during the nesting period the cormorants and their young are destroyed wholesale, owing to their being more easily approached at this time—a time at which their usefulness is greatest.

"Erroneous ideas are rife as to the quantity of fish that a cormorant can consume. Some persons assert that these birds eat as much as 21 pounds of fish daily. However, when their assertion is investigated it is found to be only conjecture. The digestive power of a cormorant is regulated by the bird's size; and the quantity of food demolished at one meal by a bird of a given species varies according to the size of its gullet, which limits its capacity for swallowing, being greater in the larger species than in the smaller. In dealing with the voracity of cormorants I might state that one hears most extravagant statements made in regard to their gluttony which, when investigated, prove to be old shibboleths more or less enlarged by the present generation and to which credence is readily given.

"As an illuminating instance I may be permitted to mention that on one occasion I engaged in conversation with a representative appointed by a fishermen's association, whose members depend on catching fish for a living. In reply to my interrogatories this fisherman stated that cormorants were able to kill and swallow fish up to 7 pounds weight, and to eat up 21 pounds weight per day; and that the cormorant could digest a fish in a few minutes. A bird was shot and identified by him as the species referred to (*P. ater*). This bird was placed on a scale in his presence and it weighed 2¾ pounds. When asked if he still maintained that a bird whose total weight was 2¾ pounds could engulf a 7-pound fish, he said that he had never thought of the relative proportions of the bird and the fish before. When further pressed to produce evidence that a cormorant could devour 21 pounds weight of fish per day, and asked to consider the fact that man himself consumes barely 3 pounds weight of food per diem, he stated that his knowledge was mainly obtained from stories which were in circulation when he was a boy and, although he had observed cormorants catching fish almost daily, he had never supposed these stories to have been incorrect."

HOW DUCK SUPPLY MAY BE INCREASED.

The pens of many conservationists have paid considerable attention to the problem of protecting and perpetuating migratory wild fowl. It is acknowledged that reduction of bag limits alone will not affect a solution. Some even go the length of maintaining that bag limits are of minor importance. However, nearly all are in agreement that food supply is vital to the problem.

Jack Miner, a pioneer in the duck sanctuary idea, fed over 4000 bushels of corn in the spring of last year to migratory wild fowl that had been educated to come to his home.

"One of the complaints," he writes, "I have heard is that the ducks' breeding grounds are destroyed. Such nonsense! There are breeding grounds in America for 99 per cent more ducks than we have. The only reasonable complaint for us not having ten ducks where we now have one is hinged on their winter quarters. We can overcome all of this by feeding. In this way we can move them from all polluted streams and stagnant lakes, which at the present time are killing our ducks by the hundreds of thousands. Feed them in marshes and lakes where the water is pure. * * * We feed to bring them to our guns, then why not feed to protect them?"

"Any bird," he continues, "that is intelligent enough to fly one-half mile from humanity for self-preservation that bird will fly clear across the continent back and forth to us for food and protection. Knowing this, we must no longer treat these birds as wild, but as migratory chickens, and let each county establish a small federal sanctuary of not less than twenty-five nor more than one hundred acres near the center of the county. This should have a dog-proof fence around it and no shooting allowed within a mile of this fence. I just mention the above as an outline, but local conditions are, after all, the determining factor and, if you have no local conditions, do as I did—make them. Plant a forest border of evergreens from four to ten rods wide all around the outside. Now liberate a few pairs of winged tipped pinioned wild ducks and geese in there, and feed and protect this haven of rest and watch results. In a few years you will find your sanctuary a stopping place for thousands of our migratory chickens, with many other species making their home in

the evergreens. In seedling trees I planted twelve years ago, there were at least 300 occupied mourning doves' nests at one time last summer. The overflow of such sanctuaries will spread all over the county and soon our bird life will be more evenly distributed throughout the nation. * * * The plan is not a joke. It has been tested out and the opportunity is pounding at the door of every county. We can bring these honking V-shaped waving lines of birds down into our little lakes, rivers, or even in artificial mud holes and have them with us for at least two months twice a year, or we can let them continue to migrate over a mile high. This is left entirely with us."

[Quoted in part from "*The Unfinished Migratory Bird Treaty*," by Jack Miner.]

STRIPED BASS GAINING IN PUBLIC FAVOR.

That many are becoming interested in the life history and habits of the striped bass is evident from recent articles appearing in various periodicals. An interesting review of striped bass fishing is contained in the *Maryland Conservationist*, and a report on research on the age and rate of growth of striped bass appears in the Zoological Society Bulletin (29, 6, 1926, pages 210–211). The latter article gives two interesting graphs made from data collected by members of the Asbury Park (New Jersey) Fishing and Gunning Club in 1924 in connection with work taken up by the Committee on Cooperation with the Bureau of Fisheries, of the Association of Surf Angling Clubs. Records of weight, length, sex, date of capture and samples of the scales were secured for thirty-five specimens. Three heavy fish, weighing respectively 38½, 34 and 39½ pounds are grouped under age 13. The curves represented in the graph show a fairly smooth curve for both females and males.

TRUMPETER SWANS SURVIVE.

Not long ago the trumpeter swan came near being listed among the extinct species of North American birds, and while it can hardly be said to be far from the ragged edge of extinction, it does appear to be gaining ground here and there. Edmund J. Sawyer, Park Naturalist at Yellowstone National Park, reports that the swan presumably breeds in the park, and appears to be increasing there, although only one pair of nesting birds has been found.—*Nature Magazine*, December, 1926.

FUR FARMING IN BRITISH COLUMBIA.

The economic value of fur-bearing species of mammals is being more keenly felt with the dwindling of their numbers in the wild, and attention is being directed toward their propagation. Fur farms are on the increase in areas where conditions are favorable for their existence. In British Columbia, for instance, there were in the neighborhood of only ninety-five fur farms in 1920.

Now comes information from the Provincial Game Warden, J. H. McMullen, that at present there are 350 fur farms. "The fur farmers are farming silver, black, blue, red and cross foxes, as well as beaver, fisher, marten, mink, muskrats, raccoon, weasel and skunk. From the returns submitted covering the operations of these fur farms to August 31, 1926, I find that the following animals are being raised in captivity or otherwise: Foxes—silver, black, blue, red and cross, 2804; beaver, 108; fisher, 16; lynx, 3; marten, 82; mink, 552; muskrat, 3040; raccoon, 76, and skunk 8. The figures given in respect of muskrats and beaver are only approximate as in many cases the fur farmers are farming these animals in the wild state and it is impossible for them to give a correct estimate of the number of animals on hand, and consequently they have only furnished approximate figures."

STATE GAME REFUGE REQUISITES.

State game preserves are to be acquired by the Department of Conservation of Michigan, under the direction of Director Lee Young. Specifications for these preserves were prepared by C. R. Lovejoy, head of the game refuges division, who was largely instrumental in the initiation of the land economic survey in Michigan. They are designed for the available lands in the state of Michigan, but are applicable to wild life conservation problems elsewhere.

To be most effective and prompt in increasing game the preserves should be located in large areas of wild land, having fair to good cover, so that the increase may spread out from the preserves and occupy surrounding territory without interference; they should be on relatively fertile lands, with a variety of natural and introduced wild life food supplies; and they should include plenty of winter cover (usually cedar swamps in Michigan) and should have rough hardwood as well as pine land adjoining.

Such preserves, it is recommended, should have generous supplies of living water; should be located and laid out to

make fire and other protection practicable at low cost; and should have a fair stocking with wild life, especially partridge and deer, so that artificial stocking will not be needed.

A standard preserve should contain a centrally located, permanent refuge or sanctuary, posted and marked with a strand of wire, to contain not less than four to ten sections (2500 to 6500 acres) while surrounding the refuge there should be a zone of state-owned land to be used as a public hunting ground, at least a mile in width, so as to make the total acreage (refuge and hunting ground together) 10,000 to 18,000 acres. Lands already owned by the state should be used as far as practicable.

Each preserve should have a resident keeper, a system of permanent fire breaks, intensive vermin control, and clearing and planting to insure adequate food and shelter.—National Conference on State Parks, Vol. 1, No. 7.

EXPERIMENTAL RABBIT FARM AT FONTANA, CALIFORNIA.

Fontana, San Bernardino County, California, has been selected by Secretary Jardine as the location of the new experimental rabbit farm, which is soon to be established by the Department of Agriculture in cooperation with the National Rabbit Federation and the Fontana Farms Company. The Bureau of Biological Survey, under a cooperative agreement with these two organizations, will finance the operation of the farm, and plan and conduct the experimental work to be done for the improvement of the rabbit raising industry throughout the country.

D. Monroe Green, associate biologist, who has been engaged in rabbit investigational work in the division of fur resources of the Biological Survey for the past two years, has been appointed to direct the experiments on the new farm and will leave Washington late in August to take up his new assignment at Fontana.

The farm will include five acres of land, on which will be erected an administration building, a house for the caretaker, a feed storage shed, hutches, and other necessary buildings to care for a large number of breeding rabbits. The land, buildings and other equipment will be furnished by the local unit of the National Rabbit Federation and the Fontana Farms Company. The purpose of the experimental farm is to develop reliable information for rabbit breeders and for those contemplating raising rabbits as to the best methods of breeding, feeding, and housing these animals to produce both meat and fur of high quality. The cooperation of local and national organizations interested in the industry will be sought in conducting the experiments.

This will be the third experimental station to be operated under the direction of the Biological Survey, one being the Experimental Fur Farm at Saratoga Springs, N. Y.; and the other the Reindeer Experiment Station at Fairbanks, Alaska. California was selected for the rabbit farm because of the representative conditions there, Fontana being about 50 miles from Los Angeles, the center of the industry, and because more rabbits are at present being raised in California than in any other state. The results of the experiments at the new station, however, will be for the benefit of rabbit raisers throughout the country.

BIRD MINDING MADE EASIER AND CHEAPER BY IMPROVED METHODS.

At this season of the year migratory flocks of bobolinks (rice birds), which are protected throughout the year by the federal migratory-bird treaty act and which may be killed only under special permit of the Secretary of Agriculture, begin to take their annual toll from ripening crops of rice, milo, and corn. Flocks of blackbirds are also active on the same crops. Though this sort of damage may be considered local in character, depending largely on the presence of nearby marshes or lakes that attract the birds, it frequently may result in serious injury to standing grain. In the few remaining rice fields on the South Atlantic coast, bobolinks still are destructive to this grain in the "milk" and "dough" stages; on the Gulf coast of Louisiana and Texas red-winged blackbirds are a menace on the southern borderline of the rice area, and in the rice fields of the Sacramento Valley and the milo fields of the Imperial Valley of California, these birds must be combated annually at a considerable expense to the farmer.

During the past year the Biological Survey of the United States Department of Agriculture has experimented with the use of small-bore rifles in place of shotguns as a bird-frightening measure in large grain fields. Though this method is by no means a new one in the West, its utility has not been previously demonstrated in the rice fields of the South Atlantic and Gulf coasts.

By using "long rifle" cartridges in a .22 caliber rifle in place of the shotgun it has been found that the ammunition cost of bird minding can be reduced to

about one-fifth. The longer range of the rifle permits individual bird minders to patrol correspondingly larger areas, reducing labor costs to about one-fourth of that ordinarily expended for control with the shotgun. In addition, both bobolinks and red-winged blackbirds respond more readily to the impact of a rifle ball than to bird shot and are more inclined to leave the fields.

For convenience in reaching all parts of the field, a shooting tower 15 to 20 feet tall built of scantling may be erected near the center of the area to be protected. This permits the bird minder to see where he is shooting and direct his shots downward into the water or soft mud of the rice field.

Although this method can be used only in large fields away from buildings and live stock and where the bird minder has a clear vision of the surrounding country, it has decided advantages over the old method. Furthermore, by substituting the rifle for the shotgun the actual work of bird minding is changed from an exhausting, nerve-racking, and often hopeless occupation to one that under some conditions may be considered leisurely and even pleasant.

It must be emphasized, however, that bobolinks, or rice birds, which are protected by federal law, may be killed only under special permit of the Secretary of Agriculture. Rice growers may make applications for such permits to the Biological Survey of the United States Department of Agriculture at Washington.

COMMISSION ACTIVITIES.

Department of Patrol.

Twenty-eight deputies have been added to the staff of patrol. Others will be put on the force as the new budget permits. The new deputies have been located in those portions of the state that have been more or less neglected in the past and where a law enforcement officer was greatly needed. The new men have been carefully selected. All range from 25 to 40 years of age and most of them are in their thirties. They have the energy of youth, yet are better balanced than younger men, are in good health and have that enthusiasm tempered with judgment that comes from a realization of the importance of their task.

To make possible more effective administration of field activities, by coordinating the work of the captains of deputies, two offices, bearing the title of "Assistant Chief of Patrol," have been created. A number of deputies have been promoted.

M. S. Clark, for many years in charge of the San Francisco patrol force, has been promoted to the post of Assistant Chief of Patrol. Captain Clark will have all the territory north of the Tehachapi. In addition to harmonizing the work of the captains in the northern counties, he will have supervision over the unattached deputies, or those not assigned to captains.

Captain Clark has served the Commission ably for sixteen years. While special agent for the Pinkerton National Detective Agency he chanced to visit the Mt. Shasta Hatchery and became so interested in the work of the Commission that he succeeded in becoming a deputy on August 21, 1911. His training and record of achievement well qualifies him for his new position.

Charles S. Bauder, for the past few years in charge of the Los Angeles office, and since January, 1926, ranked Captain of Patrol, has been promoted to the other post of Assistant Chief of Patrol. His district embraces the counties of Ventura, Santa Barbara, Los Angeles, Riverside, Orange, San Bernardino, Imperial, San Diego, Inyo, Mono and Alpine. Captain Bauder served as a technical assistant in the Commercial Fisheries Department before his appointment as a deputy on October 1, 1914. He has shown marked ability to handle men and has disposed of the many perplexing problems of a large and difficult district in a successful manner.

Four deputies have been made captains. Meritorious and faithful service during many years has gained for them this distinction and it is reasonable to assume that these men who have been advanced will be able to exercise their abilities to better advantage in their new positions.

Captain J. O'Connell will have charge of the deputies in Calaveras, Amador, San Joaquin and the southern part of Sacramento counties. His promotion comes after ten years of creditable service.

Captain Walter Sellmer will have the supervision of the deputies in Marin and Napa counties and the commercial fishing waters of Solano County. This appointment is fortunate as Captain Sellmer's enforcement experience extends to both land and sea.

Captain Edward H. Ober, the "desert deputy," has been with the Commission since September 15, 1908. He will have Alpine, Inyo and Mono counties.

Captain Edward Ricketts is also an oldtimer, having been appointed a deputy on October 1, 1910. He has been given a large district in the southern part of the state.

Many hunters were scattered everywhere throughout Inyo, Mono and Alpine counties (district 4½) on the opening day of the sage hen season. All sorts of makes and models of guns were in evidence, and the welfare of the sage hen appeared at first rather gloomy in view of this tremendous activity. Fortunately, not nearly the number of birds were killed this year that were bagged last year. Due to the restricted private holdings of the Eaton Land and Cattle Company, few birds were shot in the Long Valley section in Mono County. So long as hunters are excluded from this section, the bird will be in no danger of extinction.

Throughout the district, every principal road and trail was covered and hundreds of licenses checked. Two hunters were apprehended: one for hunting sage hens before the season opened and the other for an over bag limit. The former paid a fine of $50 and the latter one of $25.

The recent law which went into effect July 29 requires a bond of $2,500 for all nonsalaried deputies serving the Commission. Owing to this and other provisions of the law, it was necessary for the Commission to cancel the appointment of all dollar-a-year deputies and to require new appointments.

As in the past an application must be signed by the president and the secretary of a bonafide fish and game protective association or club and the applicant must be endorsed by the captain of patrol of the district in which he resides. As it was necessary to require a $5 fee accompanying the filing of each nonsalaried deputy's bond, arrangements were made to return this sum to each newly appointed deputy in the form of payment for his month's services. Such services, however, are to be voluntary after this first month and no compensation is to be rendered whatsoever.

FIG. 68. Native valley quail in breeding pen. State Game Farm, July 17, 1927. Photograph by Sidney Snow.

Nonsalaried deputies are required to file a monthly report of their activities. This is done not so much for the reason that many and frequent arrests for violations of the law are expected, as the desire on the part of the Commission to know what is being done each month for the cause in which the sportsmen and the people of the state are very much interested. The reports, in the main, contain the conditions observed afield and astream, and include notable increases or decreases in the supply of fish and game, the results had from the planting of fish or game, the

flow of water in the streams at various seasons of the year, or any other matters that are considered to be of interest or of value to the cause of wild life protection and conservation.

For the three months ending September, a total of 566 arrests have been made by the patrol force and fines aggregating $22,320 imposed. Nearly 9500 licenses were checked by the regular deputies.

Justice Ray Baugh fined a Monterey man $150 for having deer meat in his possession in closed season. Deputy Fred H. Post made the arrest.

A San Francisco "crab bootlegger" was caught by Captain Henry Lencioni and Deputy J. H. Groves in his attempt to smuggle six dozen crabs out of Humboldt County. Judge M. T. Vaughan of Santa Rosa fined him $100.

A commercial fisherman, Tomas Brigante, was fined $150 by Judge Herman Rudolph of Novato Township, Marin County. The violator had used a net two-thirds illegal under the law to take six black bass. He was unable to speak English in spite of the fact that he had resided in the state for twenty-seven years.

Deputy C. J. Walters refused to listen to a Hollywood angler who insisted that he could fish on a hunting license. Judge A. E. Rule of Mono Lake, after hearing the story, assessed the angler $25. Evidently such delusions are severe with the pocket-book.

Working on a hunch that an old offender, Peter Bollesteri, was catching striped bass with a net during the closed season. Captain Sellmer observed the fisherman's operation from a concealed vantage point and succeeded in apprehending him with two sacks full of bass. A fine of $100 was imposed by Judge Helmore.

The many-sided abilities of a deputy and the resourcefulness of the field forces of the Commission when acting in concert has been demonstrated again. Recently it was necessary to drain a large pond near Encina and some 4000 blue gill fish of all sizes were in danger of being stranded. Captain Ed Ricketts and Deputies Carmi Savage and R. J. Sadler were organized into a rescue expedition. It is reported that Captain Ricketts rushed down to the Commercial Fishery Office at East San Pedro and borrowed a seine. Deputy Savage talked to one of the leading creameries and secured 20 milk cans, while Sadler got in touch with a Pasadena sportsman who furnished a truck.

Fully equipped and clad in suitable clothes, the men advanced on the lake and seined out the fish, placed them in the cans, loaded the truck and were off for Hughes Lake, sixty miles north of Los Angeles. The loss of fish was negligible, which all goes to show that the name "minute men" often applied to the field forces, is justified.

The results of fish planting operations have almost exceeded the most sanguine expectations and work throughout has been marked with the most sincere spirit of cooperation and willingness on the part of all those concerned. On June 28, the first car of fish, 250,000 Loch Leven, was shipped from the Mt. Shasta Hatchery. The fish were taken from Suisun directly to the Gordan Valley Reservoir and planted. By September 1 car No. 1 had made sixteen trips from the Mt. Shasta Hatchery and Fort Seward Hatchery. On each trip approximately 200,000 to 250,000 fry have been transported for planting.

On July 8, car No. 2 started from the Mt. Shasta Hatchery and it had made thirteen trips up to September 1, delivering about 225,000 fish each trip.

In early July, the water in the North Creek Hatchery dropped considerable and it was necessary to move the fish. Accordingly, planting started earlier than usual and approximately 500,000 fish were planted in San Bernardino, Riverside, Los Angeles and Orange counties from this station.

Messenger shipments have been going forward from Fort Seward Hatchery to the streams in Humboldt and Mendocino counties. These shipments have been mostly of steelhead fry; a total of about 1,190,000 fish.

Some planting has been done of fry from the Tallac, Wawona and Kaweah hatcheries. Truck shipments started from the Mount Whitney Hatchery in July to make room for golden trout eggs which, due to snow conditions in the high Sierra, were obtained late this year.

A plant of 500,000 trout fry with but a loss of one-half of 1 per cent was made in July in the southern district under the supervision of Captain Ed Ricketts.

The deputies in charge of the work and the men under their direction labored night and day until the plants were com-

pleted. In each instance trucks were furnished by the county supervisors and ice was supplied by the counties and sportsmen's organizations. Thirty-seven plants were made in San Bernardino County, seventeen in Los Angeles County and eleven in Riverside County. The work was started on July 6 and wound up on July 22.

Two plants of exceptional difficulty were made. It was necessary to transport one allotment on pack animals for eleven miles in order to place the fry in Prairie Fork in Los Angeles County. The pack animals met the trucks at Los Angeles County Park near Cajon Pass, and carried the fish over the old Santa Fe Trail. The planting was started at 3000 feet elevation, the deputies working up to 8000 feet and down again. Despite the difficulties of such a long pack, but 100 fish were lost. The men worked for 36 hours straight.

In order to properly distribute 20 cans containing 20,000 fish along Big Bear Creek in San Bernardino County, the deputies were forced to lower the cans on ropes down a 110-foot cliff and pack the loaded cans on their backs for a quarter of a mile. But 20 fish, one to a can on an average, were lost in the planting.

In spite of the many details requiring attention in this plant, the deputies found time while planting the fish to arrest 13 persons for violation of the fish and game laws. All arrests were made for taking undersize fish or for failure to have an angling license. Nor was any duty neglected in rendering these arrests complete.

One prominent Los Angeles business man attempted to ride rough shod over the deputies when asked for a license. The next day this angler purchased a license and attempted to talk the agent into dating it back a day. When this fact was brought to the attention of Justice of the Peace C. R. Lynn at Pine Knot, he assessed a fine of $35 against the offender. This is $10 in excess of the usual price of such derelictions.

The fines totaled $300, and ranged from $25 to $40.

Department of Fish Culture.

All in all fish propagation has had a successful year. In a few instances the water was abnormally cold in the hatcheries, thus retarding the growth of fish. In all of the hatcheries fish are being held as late in the season as possible in order to age.

Holding tanks are being installed at a number of the hatcheries. At Yosemite Hatchery and at Lake Almanor holding tanks which will cost several thousand dollars are being built. This will make possible the holding of large numbers of spring spawned trout until winter and yet facilitate the cleaning up of the hatcheries in preparation for the fall spawning trout.

A number of improvements have been recently made at the Mt. Shasta Hatchery where more than 9,872,000 trout were awaiting distribution on July 1. A new hydro-electric plant now furnishes light and power. A refrigeration plant keeps the fish food in fresh condition. A new road has been constructed and the ponds put in first class condition.

By the end of July 2,800,000 trout had been moved from the Mt. Shasta Hatchery by trucks and railroad cars.

The 2,350,000 salmon held in ponds for liberation this fall are all in good condition and making a good growth.

In order to handle the cans of fish more easily one of the new trucks used at the Mt. Shasta Hatchery has been improved. The bed of the truck has been covered with sheet iron. Not only does this facilitate the handling of the heavy cans of fish but it also prevents damage to the bed as the result of water.

Klamath River spawning stations have been closed since the winter and numerous repairs will need to be made. Heavy freshets last winter destroyed some of the concrete work at the Beaver Creek station.

Installation of the racks of the Klamathon Spawn Taking Station was completed at the end of June looking toward the fall salmon run. The high water of last winter and spring washed out many of the rocks used in ballasting the racks and considerable difficulty was experienced in securing the necessary amount of rock.

The Rae Lakes Egg Collecting Station closed the season on July 24 with only 60,000 rainbow eggs to its credit. A crew left Independence on July 21, but were unable to get over the summit with the stock. They finally sent the pack and saddle animals back and walked in with their packs and provisions. It was necessary for them to cover about ten miles over the snow. Perhaps the heavy winter which kept the lakes closed until late in the season had something to do

with the difficulties experienced by the spawn takers.

As usual Wawona Hatchery gave considerable trouble the past season. The water becomes very warm at this station and although the fish make a rapid growth, considerable difficulty is had in keeping them in good condition. They were planted before the end of July.

At the Bear Lake Hatchery approximately 1,000,000 rainbow trout are being held for distribution this fall after frosty weather sets in and the bass have taken to deep water. This will give the trout all winter in which to live in the shallow waters of the lake without becoming the prey of black bass.

The water conditions at the Ukiah Hatchery have also been poor. Inadequate supply has made it necessary to repump the water which has passed through the troughs and use it over again. As soon as the new hatchery on Cold Creek is finished, eight miles away, it will be possible to transfer operations to this better located station. Cold Creek Hatchery has an abundance of water not affected by droughts or seasonal conditions.

Needs in the Feather River region call for the building of a large new permanent hatchery on the shores of Lake Almanor. Sufficient eggs could be supplied from the auxiliary stations.

The egg-taking station on Beaver Creek has terminated operations for this year. Fish are taken at this station in a trap placed at the top of a ladder that gives the trout the only method of passing the dam put in by the Commission. Reaching the trap, the fish mill around and then dash into a pipe that runs into the segregating and spawning house. Here the males and females are separated and the eggs taken and fertilized. The eggs are then transported into Mt. Shasta Hatchery for hatching.

High water and cold weather have been responsible for the notable poorness of the rainbow spawning season this year. The temperature of 32 degrees which prevailed early in the egg-taking season made the work almost impossible, while the high water kept the fish from coming up the creeks.

Splendid fishing has been reported from Lake Tahoe. The biological survey of the region indicated that there is a great abundance of minnows and that the high water has brought the trout near to the surface. A number of Mackinaw trout are being taken by those who know that this fish is a bottom feeder and must be sought in deep holes of 400 feet or more.

Department of Commercial Fisheries.

The albacore season began during the latter part of June. These fish are all caught by hook and line. The oldest method is that known as the "Jap method" of catching them with hand lines and lines attached to bamboo poles. A newer method is that known as the "jig method" whereby a small boat trolls for them with a jig, in somewhat the manner of salmon trolling. It has become a custom for salmon trollers from Monterey, San Francisco and Pittsburg to go south and fish for albacore. Toward the end of June, most of the salmon trollers left these three districts for southern California.

There is still agitation directed at killing sea lions because of the current opinion among fishermen that they destroy valuable food fish and are a menace to the fisheries. A fund was started to furnish bounties but the plan has now been abandoned. Before the new law went into effect, giving protection to California sea lions in districts 19, 20 and 20a, a raid was made by some unknown person on the sea lions breeding on Castle Rock. Sea lions of all kinds and sizes were killed, the scalps taken and the rest of the carcass left to rot. If control seems best as shown by the present census and survey, then the animals should be taken in a scientific way and utilization made of the carcass. Otherwise the state is wasting a valuable natural resource.

According to the market men fish have been scarce at the wholesale markets, due to the few boats fishing for market fish. This generally is the case in July and August, since a great many of the regular market boats go after albacore and tuna.

As stated in the June report, the albacore season began toward the end of that month. The run of albacore, however, was short-lived, and throughout the month of July very few of these fish were taken. Most of the albacore jig fishermen from northern California have re-

turned and state that the season was an entire failure for them. This failure of the fishermen to get albacore in any quantity this season is likely to be very hard on the southern tuna canners in a financial way. Prices as high as $300 per ton have been offered by some packers.

During the month, H. B. Nidever was appointed supervising captain and put in charge of the commercial fisheries patrol work at Monterey, which he will supervise in addition to the patrol in southern California. Nidever will also cover San Luis Obispo and cooperate with the game patrol of that county in the matter of enforcing the Pismo clam laws, in an effort to save that mollusk from extermination. The state car, a Studebaker, was turned over to Nidever to be used by him in his work of supervising the commercial fisheries patrol.

There has been a feeling on the part of sardine canners at Monterey that the sardine reduction act was not being enforced in the same manner in the southern part of the state as it is at Monterey. By adding the commercial patrol at Monterey to Nidever's duties, it is hoped that the objection will be overcome.

The work being done on barracuda is chiefly to determine the age and rate of growth by two methods, checking one against the other—age determination by examination of the scales and length frequency of the small fish. Throughout the summer months concentrated effort was made on observing the spawning season. Incidentally there were gathered data for a weight-length curve. Each of the above pieces of information is important in learning the merit of our present legislation which sets a minimum size limit, with a minor restriction as to gear during the spawning season.

Observation of the commercial catch of the so-called smelts—the large or jack smelt, the small or bay smelt and the grunion are being made, the object being to determine the proportion of each species in the markets at various seasons of the year. In addition observations have been made at the spawning time of the two smelts and the age at which the jack smelt begins spawning. Age of fish at spawning is known for grunion and is being worked out for the small bay smelt by Carl Hubbs of Michigan. Our catch records do not distinguish these three fish so that an estimate of the catch of each is best made by observations at the markets.

Paul Bonnot has completed a survey of the seals and sea lions of the California coast. Commencing the first of the year, he surveyed the entire coast and took a census of all the known rookeries. He was aided in his work by Captain Engelke and the patrol boat *Albacore*. This information, which is both interesting and valuable, will be published in a future number.

A new law which became effective July 29 now permits the importation of fresh crab meat as distinguished from canned meat from without the state for sale at any time. Persons engaged in this business according to the law are required to furnish the Commission with a copy of the invoice covering each shipment and the dealer in California must have an original invoice in his possession when receiving the crab meat. No change has been made in the law affecting local crabs which may be sold in shell only. It is also unlawful to bring crabs into the state during the closed season, namely from July 31 to November 14.

F. H. Bell recently spent three weeks at the State Fisheries Laboratory doing laboratory work in connection with his fisheries research for the International Fisheries Commission between the United States and Canada. The department considered itself complimented to have a fisheries research worker of this caliber make use of the publications of its library.

The State Fishery Laboratory and office grounds at Terminal have been landscaped. The lot composed of beach sand was first filled with soil. Shrubbery was then planted, sidewalks put in, and finally a lawn planted, all of which sets off the buildings to good advantage and makes them attractive to the eye.

From time to time, when field work permits, material is collected for various investigators engaged in some special study. This is being done at present for Dr. Skogsberg of the Hopkins Marine Station. Considerable material was gathered also for Dr. Carl Hubbs of Michigan, who is working out local races of certain California fish, including some life history work. All of this work ultimately benefits the Commission. Occasionally rare specimens are picked up at the markets, but the policy has been to avoid building up a collection which would require a cura-

tor, and instead sending such specimens where collections already exist, viz, Stanford University and Los Angeles Museum. Several display specimens have been prepared for the Los Angeles Chamber of Commerce and similar show specimens for the benefit of the Commission's southern branch are being arranged.

Bureau of Education.

Plans for the coming year include the employment of school lecturers whose duty it will be to carry a message of conservation particularly to rural schools. City school systems provide nature study supervisors but most of the children in the rural schools get little instruction relative to natural resources unless the teacher happens to be interested.

An exhibit depicting a dead doe with a young fawn standing by, which was installed at the State Fair, was arranged as a traveling exhibit. It has been shipped to the Ventura and Fresno county fairs and will be sent to other county fairs where it will continue to remind the hunter that carelessness brings about such tragedies. Someone will be in charge to answer questions and to give instruction. Wherever possible lectures illustrated with motion pictures will be given.

The new library of the Commission now presents an attractive appearance with table, chairs and rugs. The walls are lined with metal stacks containing books and pamphlets. Back volumes of conservation magazines have been punched and cut ready for insertion in binders. Several valuable reference books have been obtained from old book stores and others have been ordered. A good working library for employees is the objective sought.

A new portable motion picture machine has been purchased in order that motion pictures may be made available to those where facilities are lacking. Out-of-the-way communities will be given a chance to view the educational pictures of the Division of Fish and Game. This projector fills another need: that of a machine affording a review of new and remodeled films.

The new Yosemite Hatchery has exceeded, in a sense, almost all expectations of the ends it would serve in an educational way. Huge crowds still persist in visiting it. In fact, some 9000 persons received instruction and have shown an interest in the exhibits arranged for their edification. Colored plates of trout properly posted and labeled and small fish in vials have been decided attractions. A leaflet distributed to visitors has been very helpful.

The tendency for auto campers and picnickers to pick up young fawns, apparently lost, has been checked in the Sonoma district, according to a report. The publicity given the matter by the papers and by the schools as the result of the nature lesson issued by this Bureau which appeared in the previous issue of this publication, has assisted greatly in alleviating the problem. In fact, only one case has arisen so far in Sonoma County. In former years, it was common for such cases to run into the dozens.

Bureau of Game Farms.

The 1927 hatching season closed with the hatch of July 18, and June proved by far the busiest month in the history of the Game Farm. During June, 5000 eggs were laid and 3618 chicks hatched. Up to September 9, pheasants to the number of 3582 had been planted in various parts of the state. About 9000 in all will be planted this year. Liberations were made of both young birds capable of caring for themselves in the open and of five weeks old brooding stock with domestic mothers.

All the birds taken from the farm have been trucked out. They have been transported at night to avoid the heat of a day trip. The planting grounds have been reached early in the morning as a result of this plan. This enables the birds to get early breakfast when insect life is most sluggish and to settle themselves in cover for the day. Only two or three have showed ill effects and these only from some of the longest journeys.

Over 557 pheasants approximately five weeks old were planted four miles from Sanger on six different ranches along the Kings River bottom. The plant was made with the assistance of the Fresno County Sportsman's Club.

At the time of the liberation there was a considerable development of insect life going on. The birds seemed to sense this, were quick to find their way out of the coops and industriously to run down and hunt out the prized morsels. They were particularly effective in reducing the cut

worms that were doing damage to a vineyard near one of the places of liberation.

It is reported that a high percentage of the birds have survived. They are growing rapidly. The males are taking on color and leaving the pens. In fact, two ranchers have taken such an interest in the success of the plant that they killed off a colony of cats that failed to conform to ethical practice and turned to hunting the young pheasants. It must have occasioned pain to these ranchers to have destroyed their pets in order that the birds might remain unmolested.

In the recent liberation of 255 pheasants near Salinas the lead was taken by a pair of ringnecks raised by the Chief of Police of Salinas. As the covers were opened on the long line of crates, the Game Farm pheasants rose with a rush and immediately dashed for the cover of the trees and tall grass of Tembladero Slough. A large crowd watched the thrilling flight and a motion picture cameraman ground out several hundred feet of film.

Other liberations were made at Redding, Keyes, Chico, Marysville, Roseville and Woodland. The closed area in Napa County was planted twice.

Two automatic alarm bells have been installed at the Game Farm to protect the incubators in case the electricity which keeps them heated should be turned off. The bells operate off the power line and ring until attention is paid to the seat of the alarm. Fortunately once when the juice ceased to flow an attendant was near by to rush to the rescue of the eggs. Now this matter is not left to chance.

An ingenious device, recently perfected by Superintendent Bade, allows twelve of the pens to be supplied with water at the same instant of time. This mechanical contrivance saves the work of an attendant, for it is estimated that it would take one man some eight hours to make the round of the Game Farm if every pen had its respective faucet to be turned on. The device cools the pens and irrigates the cover in addition to supplying water to the birds. By a simple twist the spray is converted into a fountain trickling water into the sandy drinking places arranged.

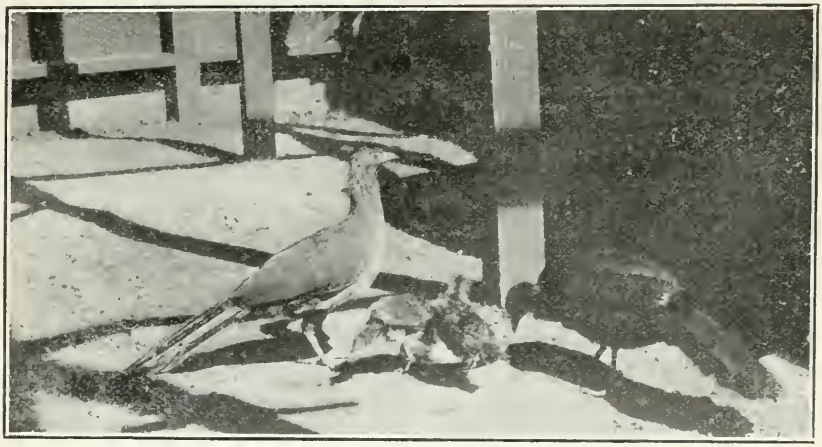


FIG. 69. Chachalacas, famous Mexican game birds, with young. These birds were successfully reared by John W. Classen of San Francisco.

Bureau of Hydraulics.

An exhaustive investigation of the oil fields both inside and outside the city of Huntington Beach has been made. Conditions were found to be very bad and complete reports which include specific cases of pollution in each case accompanied by technical descriptions and photographs of almost 100 individual wells have been compiled. An injunction suit has been filed naming seventy defendants. It is believed that the prosecution of this case will be effective in cleaning up this field.

Another survey was recently completed of the waters in Mono and Inyo counties.

Two weeks were spent in a careful and complete examination of ditches, screens and canals and locations were noted for fish screens and ladders.

On May 31, a pipe line operated by the Richfield Oil Company spanning Alamitos Bay between Huntington Beach and Long Beach, broke. Much oil was spilled on the water and over the adjacent territory. The company employed a crew to clean up shortly after the accident. Little was accomplished, however, until the bureau's attention was called to the matter and a method of cleaning up advised. Acting on this advice fifty men were put to work using shovels and spades and the oil soaked grounds and weeds were removed. The oil was cleaned from the water of the channel. Three weeks were consumed in all to correct the damage done.

Salmon are running again on the Sacramento River as a result of the completion of a new fishway installed by the Anderson Cottonwood Irrigation District. The dam maintained by the District at Redding prevented the fish from making their way up the river and reaching their spawning beds, and the completion of the fishway is a real step in the conservation of this valuable food fish. The completion of the ladder also ends a seven-year controversy. At first there was uncertainty that the fish ladder would prove successful. This occasioned delay in its construction and in turn halted the run of salmon for a while. However, the difficulties encountered were surmounted. The high water and underground water were taken care of and the ladder, which is novel in type, is working and the salmon are flashing through the pools on their way up the river.

The fishway consists of a series of pools built of concrete and steel gradually rising from the bed of the river to the top of the dam at one side and accomplishes its object in a manner never before thought feasible.

Protection of the fish in Big River, possibly the only stream in California that is still extensively used for driving logs for milling purposes, has been successfully accomplished. A new fish ladder at the Hellgate dam on the south fork of the river operated by the Mendocino Lumber Company will afford this protection. The ladder is designed by the department and allows steelhead and salmon to pass up the stream. It is a pleasure to record that the Mendocino Lumber Company plans to go further in the program of conserving fish life. This is evidenced by their recent order for work to be started on another fish ladder at the north fork of the Big River at Higgen's Camp.

LIFE HISTORY NOTES.

PIKE AND TROUT.

The squaw fish or pike has been condemned as a feeder on trout. The basis for this rests very largely on hearsay as few fishermen have been actual witnesses to the destruction of trout by pike. Waters that have formerly been alive with trout have yielded trout no longer once the pike has secured a foothold in them. And on the basis of this observation, extensive destruction of pike has been heralded as a means of conserving trout.

A former issue of this publication suggested that an investigation of the relationship between the two fishes be made or that more light be shed on the subject before final judgment be passed on the pike. In answer to this editorial, Carl L. Hubbs of the University of Michigan writes:

"I have a little information on this point, obtained last summer from the two game wardens at Roseburg and Winchester, Oregon. According to them and to other local residents, the squaw fish (the local species, *Ptychocheilus umpquae* Snyder, very similar to *P. grandis* of the Sacramento system) occurred by the thousands in the deep swift water of the North Umpqua, immediately below the dam at Winchester. They could be seen feeding voraciously on the small trout and salmon below the wheels, particularly on those which had been stunned by passing through the wheels. Those opened had these little salmonoids in their stomachs. Some of the squaw fish were scined out, but this method did not prove very thorough. Dynamite was then used, and the large squaw fish were killed by the hundreds with single discharges. When we examined the stream some time later in the summer, we found the squaw fish only moderately common, but caught some young and small adults, and saw a few large adults, some perhaps thirty inches long. Further information could perhaps be obtained from the local wardens (one in each of the two Oregon departments). I saw no reason to doubt their stories."

DOMESTICATED MEXICAN CHACHALACA.

Several years ago I was presented with what I supposed was a pair of chachalacas. As male and female look exactly alike, it was necessary to wait until the season when they would commence preparations to rear their young. But I was disappointed when both birds began laying.

After a considerable period had elapsed, I succeeded in getting another bird through the courtesy of the manager of one of our large steamship companies. The order was for a male bird, and when this latter bird arrived my hopes ran high. It was larger and lighter in plumage than the other birds, and very tame. I anxiously awaited the coming breeding season. To my surprise the three birds began laying, and another failure had to be recorded. I might add here that the birds are not very particular as to where they lay. They often dropped their eggs while resting on a perch, with the result that they were broken. The size of the egg is quite in contrast with that of the pheasant. Large, rough grained and dull white, it sometimes weighs as much as four ounces.

Two of the hens died and I was left with but one bird which proved to be two years old. On December 24, 1925, I succeeded in getting two more birds. These fortunately were young, and, though identical in appearance, turned out to be mated. They went through the 1926 breeding season without any result. The old bird sat on her nest with three eggs under her for thirty days, and repeated this process three times, but none of the eggs were fertile. The new hen did not lay at all.

This year both hens laid. They began late, for the species usually commences in April. This season, however, the first egg was laid about May 10th. As the chachalaca have two broods during the breeding season, I therefore concluded that it was barely possible they might begin laying again during August. Usually one egg is laid every other day until three or four have been laid, when the bird begins to set. While the birds are setting, they often leave the nest for over an hour at a time, and the eggs become quite cold. Several times I had about concluded that there was but little hope of the eggs hatching. Evidently the very thick shell, while apparently cold on the outside, must retain sufficient heat to prevent the egg from becoming chilled during the time it remains uncovered. The male bird does not incubate. The period of incubation is between twenty-eight and twenty-nine days.

One hen sat on three eggs and the other on two eggs. Three of this number hatched, but the other two were not fertile.

About an hour after the chicks were hatched, I was amazed to find them on the ground being fed by the parent birds. When first hatched the chicks resembled somewhat those of the golden pheasant. The tips of their bills were a dazzling white. This disappeared after a week's time.

The male bird broods the chicks as well as the hen; sometimes one chick would be found under the hen's wing and the other under the male bird's wing. The third chick hatched by the old hen was brooded alone. It was necessary to separate the two broods to avert a tragedy.

Both male and female feed the chicks by regurgitation and direct feeding. The little fellows soon learn also to eat from the ground themselves.

The mature birds always choose a place to roost well removed from the ground, nor do they change this habit when they have a brood. In the present case the nests were placed six feet above the ground. The very first night after the chicks were hatched the old birds called to them. As I had made no provision for this, it was necessary for me to construct a runway from the ground to the roosts. The chicks lost no time in using it and were soon nestling under the parents' wings. Such a procedure came natural to them.

In the wild, the birds are said to build these nests in a mesquite tree. No doubt the chicks readily reach any roost by hopping from branch to branch. In captivity this is impossible unless brush is placed in the pens.

The chicks learned to fly very soon and at three weeks had no difficulty in reaching the high roosts.

The information I have been able to obtain about the chachalaca from books has been rather meagre. One statement I came across was to the effect that the old birds left the young after they were ten days old. This may be true of birds under natural conditions, but is not borne out by those I have in captivity. The parent birds are still as solicitous for the welfare of the chicks after three weeks as they were the day they were hatched. In my opinion, both male and female are far more attentive to their chicks than are domestic fowl.

It is perhaps too soon to say whether the young birds will reach maturity. At

the present writing they appear to be getting along nicely. They were very wild at first but are gradually becoming tame.

On the whole, the chachalaca is a very interesting bird. One can hardly escape noticing its graceful movements, its very inquisitive and watchful ways. Always on the alert, it sets up a chattering or warning when strangers are about. After accustoming itself to domesticated life, it becomes very friendly.—John W. Classen.

EUROPEAN TROUT GETS OLDER SCIENTIFIC NAME.

In *Copeia*, No. 155, June 24, 1926, David Starr Jordan calls attention to the change in the scientific name of the European trout. Knowledge of this change is pertinent because the fish has been acclimated in the waters of California. According to the note, Linnaeus gave three names to the European trout in 1758: Swedish gray trout (*Salmo eriox*), the sea run trout (*Salmo trutta*) and the brook trout (*Salmo fario*). All of these are now considered a single species. Evidence is now at hand to show that Widegren, in 1862, grouped all of the varieties under the one species name of *Salmo trutta*. Under the rules of nomenclature, *Salmo trutta* has priority and therefore is the proper usage, unless it can be shown that some earlier author similarly grouped various varieties of European trout.

CONSERVATION IN OTHER STATES.

FISHERIES MERGED WITH CONSERVATION COMMISSION IN NORTH CAROLINA.

Final passage of the bill by the General Assembly to merge the State Fisheries Commission with the Department of Conservation and Development adds another division to this department and another angle of work to its program of conserving and developing the natural resources of the state.

The program of the Fisheries Commission consisting of the protection and conservation of the supply and the replenishment of the resource is to be carried forth vigorously under the direction of this department. An important part of the work of the department in connection with this great asset of the state will be toward advertising its value to the world.

Fishing is valuable, in addition to its commercial exploitation, as a sportsman's attraction, and one of the objects of the Department is to encourage the increase in the supply of game fish in the fresh water streams of the state.—*Natural Resources*, Raleigh, N. C., March 1, 1927.

KAIBAB DEER NUMEROUS.

A brief winter investigation of conditions affecting the deer on the Kaibab National Forest in northern Arizona has just been completed, in continuation of studies of the Kaibab deer problem that have been in progress since 1922 under the direction of the Biological Survey, United States Department of Agriculture, in cooperation with the Forest Service of the same department, and the National Park Service of the Department of the Interior. The present investigation indicates that on account of the overgrazed condition of their range the deer are forced to feed largely on sage brush and juniper.

On the winter range on the eastern side of the Kaibab Plateau the deer seemed to be in fairly good condition, but on the western side, where there is a greater concentration of the animals, they were found much emaciated. Within a comparatively small area the carcasses of 23 deer were found, most of which had died of starvation, though some might have been killed by predatory animals. A large number of fawns known to have been born last summer have already died of starvation, and this probably accounts in some measure for the lack of increase in the herds during the year.

The investigations have revealed that there are more deer on the range than the available forage will support and that unless many of the animals are removed the greater part of the feed there will be killed out. The deer are now concentrated on the winter ranges along the basal slopes of the Kaibab Plateau, the higher part of which at this season is deeply covered with snow.

After the creation in 1906 of the Grand Canyon Game Preserve, which has boundaries nearly identical with those of the Kaibab National Forest, no killing of the deer was permitted there until 1924, when a few hundred were removed in this way. They were further protected through the killing of large numbers of the predatory animals that formerly tended to check their increase. From a comparatively small number in 1906, perhaps 3000, the deer increased until in 1922 when it was estimated there were 20,000, perhaps a fourth or a third of

which ranged in summer on the Grand Canyon National Park. In the summer of 1924, a committee appointed by the Secretary of Agriculture to study the problem of dealing with the surplus estimated the number at 30,000, a total that some of the government experts and local residents believed conservative.

This great increase over the original numbers of deer has led to the over-utilization and destruction of forage at the present time. Legal complications concerning jurisdiction have thus far prevented carrying out plans initiated by the Forest Service for hunting on a large scale. Even if there should be a material reduction in the numbers of the deer, however, it would take many years, according to the investigators, to restore the full forage-producing capacity of both summer and winter ranges. A few hundred of the deer are killed each autumn under the state law, whereas officials of the Department of Agriculture recommend that thousands be removed in order to prevent the destruction of the forage for all. This destruction has now progressed until all forest reproduction is threatened.

MISSISSIPPI WILD LIFE REFUGE.

Regulations for the administration of the Upper Mississippi River Wild Life and Fish Refuge were signed and issued jointly on June 24 by Secretary of Agriculture Jardine and Secretary of Commerce Hoover. These regulations prescribe the conditions under which hunting and other recreational activities, including fishing and camping, will be permitted on the reservation, the general plan being to allow the public the freedom of the refuge as far as possible, consistent with the conservation of the wild life protected there. The danger from neglected camp fires is especially stressed.

The purchase of lands for the Upper Mississippi Refuge was provided for by Congress in 1924 and $1,500,000 authorized to be appropriated for the purpose, administration being assigned to the Biological Survey of the Department of Agriculture and, as far as fishes and other aquatic life are concerned, to the Bureau of Fisheries of the Department of Commerce. Areas of overflowed bottom lands along the Mississippi from Rock Island, Ill., to Wabasha, Minn., are being acquired as rapidly as possible in the states of Illinois, Iowa, Wisconsin and Minnesota.

These overflowed lands, mostly unsuited for agriculture, include many islands above which bluffs rise precipitously on either side of the river from 200 to 400 feet high, and add unusual scenic charm to an area especially adapted to the needs of wild life. Here fur and other wild mammals, birds, and fishes will, under careful conservation, have opportunity to increase in numbers, and the public at the same time will be given within reasonable limits the enjoyment of the sport of hunting and fishing. There are many sloughs and bayous within the limits of the reservation, some of which are navigable to boats of light draft. Many of these become cut off in summer and, in order to save the fish they contain, the Bureau of Fisheries in cooperation with the states sends agents each year to return them to the Mississippi or to carry them to other localities for restocking depleted streams. In this way hundreds of millions of such species as bass, pike, and sunfish are annually rescued by federal and state agencies.

The Mississippi Valley is the great highway for many species of migratory birds, including ducks and other waterfowl, and these find rest and feeding places within the refuge when making their long flights between their summer and winter homes. Quail and some ducks have in the past bred here, and during migration the refuge has been found an ideal place for many species of warblers and other small birds. Among fur-bearing animals inhabiting the refuge are muskrats, minks, raccoons, foxes, and skunks, and in the southern part some opossums. These animals will be of economic importance in the legitimate uses of the refuge.

The pearl-button industry, with a large annual output, finds an important part of its raw material in the mussel shells gathered in this general region. Spawn of some of the shellfish are carried only in the gills of certain fishes, and the mussels that furnish the shells depend for their existence upon the conservation of the fishes frequenting these waters.

THIRTY-FIFTH REFUGE JUST PURCHASED.

Pennsylvania now has thirty-five game refuges, besides several auxiliary refuges. The latest refuge to be established comprises 6500 acres along the Susquehanna River in Susquehanna County.

Pursuant to the usual system in vogue in that state, 1500 acres in the center of the refuge will be enclosed with a single strand of wire and set aside as a sanctuary, the balance being reserved for the use of the public as hunting grounds.—*Arizona Wild Life*, Vol. 1, No. 1.

REPORTS.

FISH CASES.

April, May and June, 1927.

Violation	Number arrests	Fines imposed	Jail sentences (days)
Angling License Act	23	$550 00	
Trout: over limit	39	1,625 00	90
Sunfish: closed season	6	90 00	40
Striped bass: over limit and undersized	5	130 00	
Black bass: undersized	1		180
Sacramento perch: closed season	1	20 00	
Calico bass: closed season	1	20 00	
Barracuda: undersized	3	150 00	
Young fish: illegal taking of	1	50 00	
Commercial Angling License Act	29	275 00	
Crabs: undersized and females	5	60 00	110
Abalone: undersized	18	520 00	
Crabs: illegal shipment from closed district	1	100 00	
Crab meat: sale of out of shell	1	25 00	
Clams: over limit	17	340 00	245
Nets, illegal: possession or use	21	950 00	60
Sea lions: illegal killing of	1	100 00	
Illegal shipment via parcel post	1		90
Night fishing	1	25 00	
Illegal fishing: within 250 feet of fishway	2	50 00	
Fish reservations: fishing in	6	125 00	
Pollution	1	2,000 00	
Totals	184	$5,405 00	805

GAME CASES.

April, May and June, 1927.

Violation	Number arrests	Fines imposed	Jail sentences (days)
Hunting License Act	19	$365 00	
Deer: kill doe	2	250 00	
Deer: closed season	16	1,050 00	90
Deer: not retaining hide	1		30
Ducks: closed season	4	200 00	
Mud hens: closed season	1		5
Doves: closed season	10	400 00	125
Pigeons: closed season	4	175 00	
Quail: closed season	4	75 00	20
Pheasants: closed season	5	1,145 00	
Nongame birds: killing and possession	7	120 00	10
Rabbits (cottontail and brush): closed season	21	550 00	10
Tree squirrels: closed season	2	25 00	30
Dogs: running deer in closed season	1	50 00	
Night hunting	3	50 00	180
Refuges: possession of firearms in	1	25 00	
Bird nets: illegal possession of	2	50 00	
Trespass	1	10 00	
Fur trapping regulations	1	10 00	
Totals	105	$4,550 00	530

SEIZURES OF FISH AND GAME.

April, May and June, 1927.

Halibut, pounds	26
Barracuda, pounds	4,324
Striped bass, pounds	792
Catfish, pounds	3
Salt water perch, pounds	150
Sunfish	107
Black bass	14
Trout	704
Carp	240
Sturgeon	1
Calico bass	18
Sacramento perch	1
Crabs	138
Crab meat, out of shell, pounds	150
Clams	770
Abalones	144
Rabbits (cottontail and brush)	84
Tree squirrels	2
Deer meat, pounds	541
Doves	5
Quail	5
Pheasants	5
Ducks	4
Nongame birds	19
Black bass	14

STATEMENT OF INCOME.

For the Period April 1, 1927, to June 30, 1927, of the Seventy-eighth Fiscal Year.

	Detail	Total
License sales:		
Angling licenses—1926	$10,807 00	
Angling licenses—1927	129,990 00	
Hunting licenses—1926-27	64,695 00	
Hunting licenses—1927-28	57 00	
Market fishermen's licenses—1926-27	310 00	
Market fishermen's licenses—1927-28	21,740 00	
Trapping licenses—1926-27	206 00	
Wholesale fish packers' and shell fish dealers'—1926-27	65 00	
Game breeders' licenses—1927	75 00	
Fish breeders' licenses—1927	25 00	
Total license sales		$227,970 00
Other income:		
Court fines	$11,364 92	
Fish packers' tax	36,429 82	
Kelp tax	5 41	
Fish tag sales	1,168 90	
Game tag sales	2 34	
Miscellaneous sales	15 00	
Interest on bank deposits	371 31	
Total other income		49,357 73
Total income		$277,327 73

STATEMENT OF EXPENDITURES.

For the Period April 1, 1927, to June 30, 1927, of the Seventy-eighth Fiscal Year.

Function	Materials and supplies	Salaries and wages	Service and expense	Property and equipment	Total
Administration:					
Executive and legal		$3,630 00	$357 45	$106 54	$4,093 99
Clerical and office	$344 53	4,590 00	965 63	193 15	6,093 31
Rent			2,216 74		2,216 74
Telephone and telegraph			1,149 31		1,149 31
Postage			1,090 11		1,090 11
Freight, cartage and express			368 37		368 37
Printing	5,431 75				5,431 75
Automobiles	151 72		117 95	1,790 56	2,060 23
Accident and death claims			158 96		158 96
Total administration	$5,928 00	$8,220 00	$6,424 52	$2,090 25	$22,662 77
Education and research:					
Director and assistants	$134 45	$1,778 33	$296 16	$559 53	$2,768 47
Publicity:					
Director		$880 00	$323 54		$1,203 54
Conservation and protection:					
Chief and assistants	$105 70	$1,674 99	$145 56	$27 98	$1,954 23
Clerical and office	4 65	1,272 00	2 00		1,278 65
Rent			116 46		116 46
Automobiles	161 75		178 88	1,509 75	1,850 38
Captains and deputies	955 48	37,384 01	33,587 61	90 87	72,017 97
Patrol launches	366 04	495 00	112 60	22 79	996 43
Lion hunting		405 00	328 56		733 56
Lion bounties			1,610 00		1,610 00
Statistics and game problems	277 28	1,185 00	199 09	630 48	2,291 85
Total conservation and protection	$1,870 90	$42,416 00	$36,280 76	$2,281 87	$82,849 53
Commercial fisheries:					
Chief and assistants	$559 76	$2,409 99	$330 23	$5 70	$3,305 68
Deputies	6 50	4,450 00	1,182 99	157 95	5,797 44
Patrol launches	565 76	1,170 00	313 26	38 40	2,087 42
Laboratory research	571 44	6,478 68	2,869 04	748 88	10,668 04
Statistical	67 01	1,320 00	102 76		1,489 77
Salmon tagging			63 70		63 70
Botulism			7,500 00		7,500 00
Total commercial fisheries	$1,770 47	$15,828 67	$12,361 98	$950 93	$30,912 05
Fish culture:					
Chief and assistants	$126 28	$999 99	$22 50		$1,148 77
Clerical and office	18 66	960 00	10 65	$60 05	1,049 36
Rent			94 70		94 70
Automobiles	768 52		308 22	3,728 77	4,805 51
Hatcheries	11,746 72	23,741 01	4,166 76	1,950 52	41,605 01
Hatcheries—additions and betterments				11,858 57	11,858 57
Special field investigation	10 20	1,695 00	534 10		2,239 30
Total fish culture	$12,670 38	$27,396 00	$5,136 93	$17,597 91	$62,801 22
Screens, ladders and pollution:					
Chief and assistants	$14 23	$2,205 00	$769 44	$168 89	$3,157 56
Game propagation:					
Game farm	$2,597 70	$2,385 67	$251 85	$1,983 56	$7,218 78
License commissions			$14,821 02		$14,821 02
Total expenditures	$24,986 13	$101,109 67	$76,666 20	$25,632 94	$228,394 94

CALIFORNIA FRESH FISHERY PRODUCTS FOR MONTHS OF APRIL, MAY AND JUNE, 1927.

Compiled by Divisisn of Fish and Game, Department of Commercial Fisheries.

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Sacramento, San Joaquin	Alameda, Contra Costa	San Francisco, San Mateo	Santa Cruz	Monterey
Albacore									
Anchovies							109,320	443	38,707
Barracuda								9	6
Bonito									
Carp				1,872	841	7,243	2,102		
Catfish				8,940	40,630	18,215			
Cultus Cod	10,997	5,718					67,612	5,256	12,183
Flounders	705	13,930			206	1,259	79,439	127	10
Grayfish							7,280		
Hake							41,100		
Halibut	125,391	6,971	44				4,271	984	789
Hardhead					64				
Herring							33,570	1,580	
Kingfish							11,668	17,986	9,832
Mackerel								541	116,285
Mackerel, Horse									4,265
Mullet									
Perch	4,064		15,162			586	5,674	5,012	14,138
Pike				156	719	254			
Pompano								101	12
Rock Bass									
Rockfish	24,589	17,052					221,034	132,659	198,866
Sablefish	84,965	3,573					82,759	116,936	140
Salmon	983,271	257,871		37,443	127,720	95,319	145,348	117,428	463,133
Sandabs		2,478					253,730		180
Sardines			70				139,969	36,100	4,186,096
Sculpin									117
Sea Bass—Black									
Sea Bass—White			97					1,792	1,373
Shad				43	455	201	119,646		
Shad—Buck				307,423	103,985	1,441,134			
Shad—Roe				348,226	112,414	1,404,240			
Sheepshead									
Skates							51,300		1,402
Skipjack									
Smelt	7,952		11,664			1,956	46,799	37,909	7,727

Sole	93	40,016				77	2,576,821	12,497	4,227
Splittail					115				
Striped Bass				29,545	96,123	85,750	18,745		
Suckers					486	11			
Swordfish									
Tuna—Bluefin									
Tuna—Yellowfin									
Turbot			1,304						
Whitebait	61,063		5				23,015	968	704
Whitefish									
Yellowtail									
Miscellaneous	247				10	91	8,342	1,767	733
Total fish	1,303,337	347,609	28,346	733,648	483,768	3,056,336	4,049,544	490,095	5,060,925
Crustaceans:									
Crabs	[1]74,496						[3]881,832	[5]64,584	
Shrimps			250,231				146,237		
Spiny Lobsters									
Mollusks:									
Abalones									877,850
Clams— Cockle	627		1,429						
Clams—Mixed	1,071	170	18,574						
Clams—Pismo									
Clams—Softshell			21,880			10,110	10,947		13,350
Cuttlefish		519					1,442	194	13,930
Mussels							1,217		
Oysters—Eastern			[2]18,513				[4]100,485		
Squid								245,601	5,291,894
Totals	1,379,531	348,298	338,973	733,648	483,768	3,066,446	5,191,704	800,474	11,257,949

All amount shown in pounds unless otherwise specified. Albacore and skipjack cleaned.
[1]3,104 dozen. [2]84,150 shell oysters. [3]36,743 dozen. [4]456,750 shell oysters. [5]2,691 dozen.

CALIFORNIA FRESH FISHERY PRODUCTS FOR MONTHS OF APRIL, MAY AND JUNE, 1927—Continued.

Compiled by Division of Fish and Game, Department of Commercial Fisheries.

Species of fish	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego, Imperial	Total	Mexican, brought into California via San Pedro	Mexican, brought into California via San Diego	Total Mexican brought into California
Albacore		217,688	414	33,392	251,494			
Anchovies		16,001		1,350	165,821			
Barracuda	1,739	1,877,722	106,919	505,267	2,491,662	120,281	26,173	146,454
Bonito	2	39,673	2,105	41,519	83,299		155	155
Carp					12,058			
Catfish					67,785			
Cultus Cod	16	57			101,839			
Flounders		803	68		96,547			
Grayfish		31,185			38,465			
Hake					41,100			
Halibut	55,700	101,286	13,526	16,281	325,243		185,742	185,742
Hardhead					64			
Herring					35,150			
Kingfish		83,479	432	1,799	125,196			
Mackerel	78	538,341	64,242	227,778	947,265		1,090	1,090
Mackerel—Horse		61,412			65,677			
Mullet		887		2,327	3,214	700	5,408	6,108
Perch	286	9,096			54,018		220	220
Pike					1,129			
Pompano		2,126		294	2,533	12,366	15,620	27,986
Rock Bass	991	91,688	20,357	57,928	170,964	73	3,001	3,074
Rockfish	35,523	576,838	4,744	483,927	1,695,232	540		540
Sablefish	18	175			288,566			
Salmon					2,227,533			
Sandabs		4,420	100		260,908			
Sardines	180	12,949,411		2,428,548	19,740,374			
Sculpin		21,803	157	7,552	29,629			
Sea Bass—Black	350	2,694	13,405	27,874	44,323	100	14,169	14,269
Sea Bass—White	8,834	211,496	3,035	94,137	320,764	95,913	171,302	267,215
Shad					120,345			
Shad—Buck					1,852,542			
Shad—Roe					1,864,880			
Sheepshead		18,733	42	935	19,710			
Skates		2,338			55,040			
Skipjack						511,684	1,353,110	1,864,794
Smelt	17,576	92,454		7,297	231,334			

Sole	74,609	1,468	568	457	2,710,833			
Splittail					115			
Striped Bass					230,163			
Suckers					497			
Swordfish		2,347		2,608	4,955			
Tuna—Bluefin		766,603		217,462	984,065			
Tuna—Yellowfin						4,566,911	3,154,413	7,721,324
Turbot					1,304			
Whitebait					85,755			
Whitefish		37,086		32,664	69,750	615	1,724	2,339
Yellowtail		173,483	41	143,707	317,231	91,897	129,633	221,530
Miscellaneous	6,647	24,312	231		42,380	415	5,760	6,175
Total fish	202,549	17,957,105	230,386	4,325,103	38,278,751	5,401,495	5,067,520	10,469,015
Crustaceans:								
Crabs					[6]1,020,912			
Shrimps					396,468			
Spiny Lobsters							69,992	69,992
Mollusks:								
Abalones	4,098				881,948			
Clams—Cockle					2,056			
Clams—Mixed		381			20,199			
Clams—Pismo	61,838				61,838			
Clams—Softshell					42,937			
Cuttlefish	61				15,566			
Mussels	20				15,167			
Oysters—Eastern					[7]118,998			
Squid		148			5,537,643			
Totals	268,566	17,957,637	230,386	4,335,103	46,392,483	5,101,495	5,137,512	10,539,007

[6]42,538 dozen. [7]540,900 shell oysters.

CORRECTION.

In the October, 1926, issue of *California Fish and Game*, page 214, California Fresh Fishery Products for months of April, May and June, 1926, item of Marlin, 764 pounds Monterey and 8023 pounds Los Angeles, total catch 8787 pounds, should read "Mackerel, Horse," instead of "Marlin."

INDEX TO VOLUME 13.

A

Abels, Henry J., 171.
Accipiter cooperi, 147.
Accomplishments vs. future program, 114.
Administration, 113.
Aechmophorus occidentalis, 147.
African conservationists have new troubles, 122.
Aku, 121.
Albacore, 58, 61, 213, 290, 291; and tuna, hooks found in, wanted: 141; caught near Monterey, 141–142.
  Long-finned, 121.
  Yellow-fin, 121.
Albert, W. E., 118, 119, 275.
Allen, J. W., 206.
Allred, K. P., 60, 211.
American Association for the Advancement of Science, Pacific Division, 108.
American Can Company, 143.
American Field, 201, 205, 222, 223.
American Fisheries Society, 53, 54.
American Forests and Forest Life, 41, 126, 272, 280.
American Game, 115, 125, 156, 275.
American Gamekeepers' Society, 94.
American Game Protective Association, 94, 131.
American Nature Association, 276.
Anas platyrhynchos, 147.
Anchovy, 22.
Anderson-Cottonwood Irrigation District, 48, 64, 294.
Andrews, A. J., 136.
Andrews, C. B., 142; albacore caught near Monterey, 141–142.
Anglo American Telephone Company, Direct U. S. Cable Co. vs., 15.
Ankeny, John D., 187.
Ankeny, Levi, 187.
Annual census of waterfowl at Lake Merritt, Oakland, California, 146.
Anquilla chrysypa, 218.
Antelope, 69.
Antler, 235, 236, 237, 250; and horns, 53.
Aquila chrysaetos, 66.
Argentina prohibits the exportation of tinamous, 120.
Arkansas introduces beaver, 224.
Associated committees for wild life conservation in New England, 224.
Associated Sportsmen's Clubs, 49, 50, 96, 195.
Audubon Society reports on educational work, 49.
Auk, The, 206.
Ayu eggs, 59; imported, 42–43.

B

Babcock, J. P., 170.
Bade, August, 103, 278, 293; believe it or not, 27–29, 98–99; game bird farming, 77–92; game propagation, 99–102; food habits of the Chinese pheasant, 184–187.
Badger, 272; a California, 220.
Baird, Spencer F., 165.
Baldpate, 146.
Barker, E. H., 211.
Barnes, Earl, 203.
Barracuda, 61, 138, 291; effects of the recent law prohibiting the taking of, in California waters with purse seine or round haul nets, 18–25.
Bass:
  Black, 191.
  Striped, 64, 107, 110, 138, 165, 166, 276; as I know them, 25–27; once more, 42; in Maryland, 129; gaining in public favor, 284.
  White sea, 23, 25.
Bauder, C. S., 62, 286.
Baugh, Ray, 136, 211, 288.
Bayside Fish Flour Company, 13.
Bear, 191, 248, 272.
  Black, 126, 208.
  Cinnamon, 197.
Beaver, 52, 191, 207, 225, 272, 284; Arkansas introduces, 224.
Beebe, William, 48, 101.
Behr, Ernest E., 139.
Believe it or not, 27–29, 98–99.
Bell, F. H., 291.
Benson, Theodore, 279.
Better protection for steelhead needed, 47.
Bianchi, Paul, 271.
Biological survey chief surveys the duck situation, 49–50.
Bird, game, farming, 77–92; depredations of, in fruit orchards, 199–201; the British wild, protection bill, 223–224; a new book, 276; minding, made easier and cheaper by improved methods, 285–286.
Bird and Arbor Day, 48.
Bird Lore, 120.
Bird Notes and News, 70.
Bittern, 183.
Black, H. E., 211.
Blackbird, 285.
Black duck, 153.
Blue, J. M., 187.
Bobcat, 248.
Bobolink, 285; reedbirds or, no longer permitted to be killed, 208–209.
Bollesteri, Peter, 288.
Bonito, 121; migration of, in the North Pacific, 49.
Bonnot, Paul, 142, 291.
Books, interesting, on fish, fisheries and related subjects, 29–35; bird, a new, 276.
Bounty, 51; rabbit, fails in Kansas, 128.
Brief, for the cormorant, 282–283; for the pheasant, 205–206.
Brigante, Tomas, 288.
Bringing back the quail, 66–67.
British wild birds protection bill, 223–224.
Brown, William S., 246.
Brownlow, O. P., 136, 195, 211; eastern brook trout planted in Moraine Lake, Tulare County, 129–130.
Bruce, Jay, 211, 246, 273; lion hunter, scientific data secured by, 123–124.
Bryant, H. C., 59, 61, 65, 106, 179, 186, 200, 206, 213, 240, 242, 245, 258; the opossum reaches San Diego County, 146; depredations of birds in fruit orchards, 199–201; directory of bird-life of the San Francisco Bay region, 201–202; a new bird book, 276.
Buck, 241, 248, 249, 279.
  Granite, 238.
  Pacific, 238.
  Prong, 238.
Buckskin, 234.
Buffle-head, 146.
Bullard, A., 60.
Bullard, F. A., 171.
Bullfrog, the eastern in Southern California, 222.
Bundock, C. L., 211.
Burbank, Luther, 48.
Bureau of, Animal Industry, 117.
  Education and Research, 54, 114, 139, 213.
  Education, 270, 292.
  Finance and Accounts, 113.
  Game Farms, 62, 140, 215, 292–293.
  Hydraulics, 114, 139, 214, 293–294.
  Pollution, 65.
  Publicity, 62.
  Public Relations, 140, 214.
  Research, 270.

Screens and ladders, 64.
Statistics and Game Problems, 63, 114, 140, 215.
Burke, John, 122.
Butcher-bird, 199.

C

Cady, F. P., 247.
California Academy of Sciences, 105.
California Acclimatizing Society, 164.
California Development Association, 46, 58, 104, 110, 140.
CALIFORNIA FISH AND GAME, 120, 129, 194, 199, 222.
California Fish and Game Commission, Ocean Industries vs., 54–55.
California's fishery statistics, 216; lauded, 202–203.
California forests, one of state's greatest natural resources, 209–210.
California Packing Corporation, 217.
California quail in New Zealand, 128.
California salmon may feed off British Columbia coast, 43–45.
California sardine investigations, 143–145.
California Sea Products Corporation, 146.
California State Fisheries Laboratory, 18, 29, 108, 138, 141, 142, 213, 216, 291; serials newly acquired by, 145.
Calvin, E. E., 171.
Cambarus blandingii, 222.
Canadian regulations regarding sanctuaries, 54.
Cancer magister, 146.
Cane gun illegal in California, 122.
Canvasback, 146.
Capper's Weekly, 56.
Carey, Henry R., 126.
Caribou, 55, 208.
Carpenter, S. J., 60.
Carr, O. W., 199.
Cat, 54; eat birds, 50–51.
Civet, 272.
Ringtail, 272.
Wild, 272.
Catalina Islander, 50.
Catfish, 59, 197, 202.
Censuses, game, 197.
Ceryle alycon caurina, 147.
Chachalaca, 118; Mexican, domesticated, 295–296.
Chapman, Frank, 120.
Charles, Judge, 136.
Chickadee, 199.
Chief of patrol attends eastern convention, 53–54.
Christivomer nemayeush, 262.
Chumming is legal, but—, 43.
Clam, 138.
Pismo, 188, 191, 291.
Razor, 188.
Clark, G. H., 120.
Clark, H. Walton, the ratfish or elephant fish, 220–221.
Clark, M. S., 104, 211, 286.
Clarkson, George B., 269.
Classen, John W., domesticated Mexican chachalaca, 295–296.
Classification of vermin, 125.
Clock, Ralph H., 62.
Cod, rock, 61.
Coleman, George A., 42, 59, 105, 138, 212; notes on the food of the western robin, kingfisher and other birds, 147–148; fishing conditions in Lake Tahoe, 261–263.
Collinge, W. E., 206.
Coluber, gray, 205.
Red, 205.
Columbia river bird refuge, 70.
Colymbus nigricollis californicus, 147.
Commercial Fishery Notes, 141–146, 216–219.
Commission Activities, 59–66, 136–140, 211–216, 286–294.
Commission given power to close streams to fishing, 192–193.
Commissioners, new, appointed, 269.
Comparison of game conditions, 126–127.
Complete your file, 120–121.
Condor, The, 53, 282.
Confiscation of net declared legal, 119.
Connecticut vs. Greer, 5.
Conservation, time element important in, 41; necessities, 114–115; unified plan for elk, 208; commission, fisheries merged with, in North Carolina, 296.
Conservation in Other States, 68–70, 222–225, 296–297.
Convention, second annual, employees of the California Fish and Game Commission, 102–107.
Coolidge, Calvin, 70, 225.
Coot, 146.
Copeia, 296.
Corbett, Pitt, 15.
Cormorant, a brief for the, 282–283.
Count of Jackson Hole elk made by officials, 209.
Cox, W. T., 56.
Coyote, 248, 255, 272.
Crab, 60, 291; male legal in California, 146.
Craig, J. A., effect of the recent law prohibiting the taking of barracuda in California waters with purse seine or round haul nets, 18–25.
Crane, sandhill, 183.
Crappie, 59.
Crayfish, 67, 282; eastern, in San Diego County, 221–222.
Crow, 205.
Crustacean, 282.
Curassow, 118.
Curlew, 183.

D

Dabbene, Roberto, 120.
Dado, S. H., California's fishery statistics, 216.
Dallas Pearl Essence Company, 216.
Davis, Richard, 264.
Dayton, Earl T., 271.
Deer, 53, 106, 123, 126, 128, 135, 139, 153, 181, 183, 184, 188, 194, 207, 213, 266, 267, 285; hunters numerous in coast range, 49; in New York, 68–69; increasing in Stanislaus Forest, 125; tag license act, 189; have you a, tag license? 194; Idaho furnishes salt for, 223; the, of California, 233–258; kill, season 1927, 270; licks, 277–278; violator apprehended, 279; Kaibab, numerous, 296–297.
Black-tailed, 238, 240, 241–243.
California mule, 239.
Chamois, 238.
Columbian black-tailed, 239.
Mule, 238, 243–259.
Rocky mountain mule, 239.
Southern black-tailed, 239.
White-tailed, 238.
Denny, Owen, 94.
Department, of Commercial Fisheries, 2, 6, 61, 107–110, 113, 114, 120, 138, 213, 276, 292–293.
Fisheulture, 59, 113, 124, 136–138, 175, 212–213, 278, 289–290.
Forestry, 194.
Natural Resources, 103, 269, 270; the new, 194.
Patrol, 60–61, 136, 211, 212, 269, 286–289.
Petroleum and Gas, 194.
State Parks, 194.
Depredations of birds in fruit orchards, 199–201.
Deputies receive new manual, 42.
Deserted fawns, 194.
Dice, L. R., 201.
Didelphis virginianus, 146.
Dinsdale, L. W., 60.
Direct U. S. Cable Company vs. Anglo American Tel. Co., 15.

Directory of bird life of the San Francisco Bay region, 201–202.
Dirks, W. N., 243.
Discretionary powers, 114.
Disease, of deer, 135, 248, 249.
Duck, 122–123.
Hoof and mouth, 249.
Mountain sheep, possible, 222.
Pheasant, 83.
Division of Scientific Inquiry, 138.
Division of Water Rights, 64.
Dixon, Joseph, and Wright, George M., annual census of waterfowl at Lake Merritt, Oakland, California, 146.
Do you know your game warden, 194–195.
Doe, 60, 250, 253, 266, 278, 279, 292.
Dog, 54.
Dollar-a-year wardens, 96–98.
Dollar, Robert, 218.
Domesticated Mexican chachalaca, 295–296.
Dowitcher, 184.
Duck, 42, 43, 56, 60, 63, 119, 128, 129, 136, 180, 181, 182, 183, 184, 267, 297, biological survey chief surveys, situation, 49–50; disease, 122–123; survey of, conditions planned, 125–126; drives, 128–129; fund, 195; plans for increasing the, supply, 195–196; home grown, plentiful, 278; refuge, a novel type of, 280; how supply may be increased, 283–284.
American golden-eye, 146.
Baldpate, 146.
Black, 153.
Buffle-head, 146.
Canvasback, 146.
Mallard, 70, 98, 131, 146, 147, 153.
Merganser, 147.
Pintail, 131, 146.
Ruddy, 146.
Scaup, 146.
Shoveller, 146.
Wild, 70.
Wood, 153.
Dunn, Duncan, 94.
Dunne, Frank, 62.
Dunwoody, Charles, 104; the viewpoint of an onlooker, 110–112.

E

Eagle, status of the golden, in southern California, 66.
Bald, 248.
Earmarks of progress, 192.
Eastern brook trout planted in Moraine Lake, Tulare County, 129–130.
Eastern bullfrog in southern California, the, 222.
Eastern crayfish in San Diego County, 221–222.
Eaton Land and Cattle Company, 287.
EDITORIALS:
Time element important in conservation, 41; predictions of game abundance needed, 41; striped bass once more, 42; deputies receive new manual, 42; something more than protection, 42; pike and trout, 42; ayu eggs imported, 42–43; chumming is legal, but—, 43; California salmon may feed off British Columbia Coast, 43–45; the warden's viewpoint, 45; weeds or wildfowl, 45–46; game warden's job a dangerous one, 46; local game refuges, 46; two sides of a question, 46; whaling operations start in southern California waters, 46–47; better protection for steelhead needed, 47; some resolutions of the western fish and game commissioners' association, 47; how many fish will a stream support, 47–48; fish ladder on Sacramento river being installed, 48; tree squirrels in the Laguna mountains to receive winter food supply, 48; bird and arbor day, 48; a new book on pheasants, 48–49; migration of bonitos in the north Pacific, 49; Audobon society reports on educational work, 49; deer hunters numerous in coast range, 49; biological survey chief surveys the duck situation, 49–50; safety screen to be installed at Lake Almanor, 50; spot whales by airplane, 50; cats eat birds, 50–51; the goats of Guadalupe Island, 51–52; regulation of shooting devices discussed, 52; our ranch folks, 52; new bulletin on fur laws issued, 52–53; the tule goose, 53; horns and antlers, 53; chief of patrol attends eastern convention, 53–54; Canadian regulations regarding sanctuaries, 54; Ocean industries vs. California fish and game commission 54–55; reindeer industry in Alaska, 55–56; fewer fish in Great Lakes, 56; president increases area of wild life reservation, 56; federal and state governments cooperate to enforce game laws, 56–57; increased hunting and fishing license fees needed, 113–114; discretionary powers, 114; accomplishments vs. future program, 114; conservation necessities, 114–115; in memoriam, 115; another game farm contemplated, 115; qualifications of a game keeper, 115–116; insect food for young pheasants, 116–117; pheasant season disappointing, 117; a new book on game bird propagation, importation of quail from Mexico, 117–118; experiment with tropical game birds, 118; pheasant fills need in Iowa, 118–119; state refuges for wild fowl, 119; confiscation of net declared legal, 119; what do sea lions eat, 119–120; Argentina prohibits the exportation of tinamous, 120; complete your file, 120–121, varieties of tunnies and swordfishes described, 121–122; cane gun illegal in California, 122; African conservationists have new troubles, 122; duck disease, 122–123; scientific data secured by lion hunter Bruce, 123–124; storm damage, 124; an Indian brush dam for the taking of fish, 124–125; the value of wild fowl, 125; deer increasing in Stanislaus forest, 125; classification of vermin, 125; survey of duck conditions planned, 125–126; worse than a crime—a mistake, 126; a comparison of game conditions, 126–127; a uniformed patrol force, 127; opossum depredations increasing, 127; the real enemy, 127–128; the relation of forests and forestry to human welfare, 128; Mount Tamalpais refuge, 128; rabbit bounty fails in Kansas, 128; California quail in New Zealand, 128; duck drives, 128–129; striped bass in Maryland, 129; migratory wild fowl in Mexico, 129; eastern brook trout planted in Moraine Lake, Tulare County, 129–130; reindeer industry promises to be important to Alaska, 130; heavy wild fowl losses result of reduced water areas, 130–131; Paul G. Redington is named chief of biological survey, 131–133; 1926 fire record for national forests of California, 133; forest conservation a national opportunity, 134; increased license fees provide for enlarged program, 192; ear marks of progress, 192; commission given power to close streams to fishing, 192–193; experience best teacher, 193; have you a deer tag license, 194; the new department of natural resources, 194; deserted fawns, 194;

do you know your game warden, 194–195; fish distribution, 195; natural history instruction in the schools, 195; the duck fund, 195; plans for increasing the duck supply, 195–196; quail receive added protection, 197; game farm a busy place, 197; game censuses, 197; pheasant plantings, 197–198; sport for the angler in San Francisco Bay, 198–199; depredations of birds in fruit orchards, 199–201; millions of hunters, 201; mixing faunas, 201; directory of bird-life of the San Francisco Bay region, 201–202; California fishery statistics lauded, 202–203; the relations of birds to forests, 203; a "jerky" hermit, 203–204; game propagation in Washington, 204; specifications for state game preserves, 204–205; vermin and quail, 205; a brief for the pheasant, 205–206; the food of terns in England, 206–207; game and fur farmers aided by U. S. scientists, 207–208; revised hunting and trapping regulations issued for Alaska, 208; unified plan for elk conservation, 208; reedbirds, or bobolinks, no longer permitted to be killed, 208–209; count of Jackson Hole elk made by officials, 209; California forests, one of the state's greatest natural resources, 209–210; new commissioners appointed, 269; four-year program inaugurated, 269–270; department of natural resources, 270; survey of game refuge boundaries planned, 270; deer kill, season 1927, 270–271; an unappreciated natural resource, 271–272; the value of the trappers' catch, 272; game management, 272–273; hatcheries to serve full time, 273; mountain lion control, 273; summer resort educational work, 273–274; safety for pheasants, 275; pheasants a benefit, 275; a new salmon law, 275–276; a new bird book, 276; hawk bulletin available to teachers, 276; fisheries statistics furnish basis for legislation, 276; photographic evidence, 277; deer licks, 277–278; personnel file improved, 278; state fair exhibit, 278; home grown ducks plentiful, 278; new films of state game farm secured, 279; the shad in Oregon, 279; deer violator apprehended, 279; scout service to wild life, 279–280; a novel type of duck refuge, 280; public shooting grounds suggested, 280–281; floating reduction factories, 281–282; a brief for the cormorant, 282–283; how duck supply may be increased, 283–284; striped bass gaining in public favor, 284; trumpeter swans survive, 284; fur farming in British Columbia, 284; state game refuge requisites, 284–285; experimental rabbit farm at Fontana, California, 285; bird minding made easier and cheaper by improved methods, 285–286.

Educational films and lantern sildes of the California Fish and Game Commission, 36–40.

Educational, summer resort, work, 273–275.

Eel, American freshwater, 218.

Effect of the recent law prohibiting the taking of barracuda in California waters with purse seine or round haul nets, 18–28.

Elephant, 122.

Elephant fish, the ratfish, or, 220–221.

Elk, 53, 139, 207, 224, 237; unified plan for, conservation, 208; count of Jackson Hole, made by officials, 209; commission, 209; brought back to old haunts in Blue River country, Arizona, 225.

Ellery, H. E., public shooting grounds suggested, 280–281.

Ellis, John A., 60.

Ellis, S. L. N., 171.

Ellsworth, Rodney S., second annual convention employees of the California Fish and Game Commission, 102–107.

Essig, E. O., 148.

Etrumeus micropus, 141.

European trout gets older scientific name, 296.

Evermann, Barton Warren, 121.

Exhibit, 292; State Fair, 278.

Experience best teacher, 193.

Experiment with tropical game birds, 118.

Experimental rabbit farm at Fontana, California, 285.

F

Facts of current interest, 58, 113.

Farming, game bird, 77–92.

Farnham, L. P. 60, 136.

Farwell, J. D., 164.

Fawn, 60, 153, 242, 246, 249, 250, 252, 253, 254, 255, 256, 292; deserted, 194.

Federal and state governments cooperate to enforce game laws, 56–57.

Federal Game Refuge and Public Shooting Ground Bill, 53.

Ferguson, A. D., 171.

Fernald, Reginald S., 269.

Fewer fish in Great Lakes, 56.

Field and Stream, 128.

Films, educational, and lantern slides of the California Fish and Game Commission, 36–40; new, of state game farm secured, 279; new fish planting, secured, 54.

Fire record for national forests of California, 1926, 133.

Fish, food, an historical review of the legal aspects of the use of for reduction purposes, 1–18; interesting books on, fisheries and related subjects, 29–35; how many, will a stream support, 47–48; ladder on Sacramento River being installed, 48; an Indian brush dam for the taking of, 124–125; history of planting in California, 163–174; distribution, 195.

Harvest, 218.

Ratfish or elephant, 220–221.

Squaw, 42.

Fish and Game Commission, 42, 48, 50, 53, 57, 58, 60, 61, 63, 96, 107, 113, 119, 120; Van Camp Sea Food Co., Inc. vs., 10; California, educational films and lantern sildes of the, 36–40; California, second annual convention employees of the, 102–107.

Idaho, 205.

Montana, 223.

Nebraska, 223.

North Dakota, 153.

Ohio, 69.

Oregon, 120.

Pennsylvania, 136.

Virginia, 68.

Washington, 204.

West Virginia, 69.

Fish and Game Study Committee, 46, 58, 119, 140.

Fish and Game Protective Association, San Diego, County, 48; San Joaquin, 61.

Fish Bulletin No. 11, being a review of, "The California Sardine," 113–145.

Fish Exchange Act, 13.

Fisher, 52, 218, 272, 284.

Fisher, A. K., 125.

Fisher, C. O., 215.

Fisheries statistics furnish basis for legislation.

Fisheries merged with conservation commission in North Carolina, 296.

Fishing, commission given power to close streams to, 192–193; conditions in Lake Tahoe, 261–263; and hunting reminiscences, 180–184.
Five-man commission appointed in Virginia, 68.
Floating reduction factories, 281.
Fluke, liver, 248.
Follett, W. I., 199, 220; male crabs legal in California, 146.
Fontana Farms Company, 285.
Food, of cormorant, 282.
Deer, 258.
Pheasant, 86, 205, 275; habits of the Chinese, 184–187.
Pike, 294.
Sea Lions, 119.
Swordfish, 261.
Terns in England, 206–207.
Trout, 148; habits of, 148–149.
Forbush, Edward Howe, 50.
Ford, Pearl, 103.
Forest conservation a national opportunity, 134.
Four-year program inaugurated, 269–270.
Fox, 52, 104, 297.
Black, 284.
Blue, 207, 284.
Cross, 284.
Kit, 191, 272.
Gray, 272.
Red, 272.
Silver, 207.
Fox, Claud, 180.
Franco-Italian Packing Company, 141.
French League for the Protection of Birds, 70.
Fresno Bee, 214.
Frog, 282.
Fundules, 47.
Furbearers, Louisiana rich in, 69.
Fur farming in British Columbia, 284.

G

Gadwall, 131.
Gallagher, John P., 214.
Game, predictions needed of abundance, 41; warden's job a dangerous one, 46; bird farming, 77–92; propagation, 99–102, 114; keeper qualifications of, 115, 116; bird propagation, a new book on, 117; birds, tropical, experiment with, 118; conditions, a comparison of, 126, 127; propagation in other states, 149–156; censuses, 197; propagation in Washington, 204; and fur farmers aided by U. S. scientists, 207, 208; management, 272, 273.
Game Farm, State, 59, 61, 65, 114, 116, 192, 211, 270, 279, 214; a busy place, 197; another contemplated, 115.
Oregon, 117.
Washington, 27.
West Virginia, 152.
Gander, Frank F., 146; eastern crayfish in San Diego County, 221, 222.
General Petroleum Company, 214.
George, F. A., the eastern bullfrog in Southern California, 222.
Gerber, John, 64.
Gill, John, 121.
Gillespie, Frank A., 122.
Gland, Metatarsal, 237, 243.
Glidden, Ed., 136.
Globe Cotton Oil Mills, 13.
Goats, of Guadalupe Island, 51, 52.
Mountain, 224.
Godwit, 184.
Goldfinch, 41.
Goodwin and Hart, 183.
Goose, 182, 206; the tule, 53.
Canada, 131, 153.
Honker, 60.
Snow, 146.
White-fronted, 53.
Wild, 70.
Graves, Henry S., 128.
Grayling, nearly extinct in Michigan, 222.
Great Lakes Fisheries Conference, 202.
Grebe, 184.
American eared, 146, 147.
Pied-billed, 147.
Western, 146, 147.
Green, D. Monroe, 285.
Green, Mary A., 115.
Green, Monroe, 166.
Green, Seth, 164.
Green, W. J., in memoriam, 115.
Greene, B. D., Marx, 14, 16, 54, 104, 105, 211; an historical review of the legal aspects of the use of food fish for reduction purposes, 1–18.
Greer vs. Connecticut, 5.
Grey, Viscount, 70.
Grey, Zane, 121, 122.
Griffith, Ray, 122.
Grinnell, Joseph, 202.
Grouse, 139, 207.
Franklin, 154.
Ruffed, 116, 119, 202.
Groves, J. H., 60, 288.
Grunion, 190.
Gull, 70.
California, 146.
Glaucous-winged, 146.
Ring-billed, 146.
Gun, cane, illegal in California, 122.
Gyger, J. H., 171.

H

Halibut, 23, 25, 58, 109, 143.
Hall, E. Raymond, The deer of California, 233–258.
Hammock, Bruce L., 60.
Hanna, W. C., 66.
Hare, 207, 266.
Harpoon, 259.
Harris, Manly S., 125.
Hart and Goodwin, 183.
Hatchery, 69, 113, 192, 269, 270; four new, for California, 174–180; to serve full time, 273.
Bear Lake, 212, 290.
Big Creek, 137, 175, 176.
Brookdale, 42, 137, 175, 212.
Burney Creek, 168, 175, 176–178.
Cold Creek, 290.
Feather River, 289.
Fern Creek, 171, 175, 180.
Fort Seward, 212, 288.
Fort Sutter, 212.
Kaweah, 212, 288.
Lake Almanor, 289.
Mt. Shasta, 42, 59, 124, 137, 169, 212, 288.
Mt. Whitney, 288.
North Creek, 288.
San Leandro, 166.
Shebley, 166.
Sisson, 169, 170.
Tallac, 288.
Ukiah, 290.
Verdi, 155.
Wawona, 288, 290.
Yosemite, 137, 165, 175, 178–180, 289, 292.
Have you a deer tag license? 194.
Hawk, 126; bulletin available to teachers, 276.
Cooper, 147, 205.
Sharp-shinned, 205.
Hawley, L. C., 153.
Hay, Wm. P., 222.
Hellard, J. H., 60, 203; a "jerky" hermit, 203, 204; an Indian brush dam for the taking of fish, 124, 125.
Helmore, Paul, 288.
Henderson, A. C., 214.
Heron, A. E., 103.
Heron, blue, 60, 70, 183.
Night, 183.
Herring, the occurrence of the Japanese, 141.

Herrington, W. C., 142.
Higgins, Elmer, 138, 141, 144.
Hill, J. H., 211.
Himantopus Mexicanus, 147.
Historical review of the legal aspects of the use of food fish for reduction purposes, 1–18.
History of fish planting in California, 163–174.
Hoesch, John M., 60, 136.
Hoffman, Ralph, 276.
Holladay, C. E., 60, 136.
Holmes, Ovid, 60, 106.
Home grown ducks plentiful, 278.
Hooper Foundation for Medical Research, 61, 63, 140, 142, 215.
Hopkins Marine Station, 291.
Hornaday, Wm. T., 279.
Horns, and antlers, 53.
Howard, Dr., 116.
How duck supply may be increased, 283, 284.
Howe, Helen Y. and Meigs, Avis, food habits of trout, 148, 149.
Hubback, C. E., striped bass as I know them, 25–27.
Hubbs, Carl, 291, 294.
Huey, Lawrence M., 51.
Hughes, J. M., 136.
Hughes, William, 203.
Hummingbird, 60, 199.
Hunt, E. W., 169.
Hunter, J. S., 53, 104.
Hunter, market, 267.
Hunting and fishing reminiscences, 180–184.
Hunting, night, 266.
Huntington, Collis P., 170.
Hydrologus collici, 220.

I

Idaho, furnishes salt for deer, 223; game refuges, 223; open season, 224.
Importation of quail from Mexico, 117, 118.
Indian brush dam for the taking of fish, 124, 125.
In memoriam, 115.
Insect food for young pheasants, 116, 117.
International Association of Game and Fish Conservation Commissioners, 47, 53.
International Fisheries Commission, 119, 142, 143, 291.
International Pacific Salmon Investigation Federation, 43–45, 138, 142.
Irvine, Robt. J., 63.
Ishikawa, Dr., 43.
Izaak Walton League of America, 56, 208, 209.

J

Jackson, Carl R., the occurrence of the Japanese herring, 141; a trial shipment of fish from the Atlantic Coast, 217, 218; a new tuna boat, 218.
Jaeger, Edmund, possible disease in mountain sheep, 222.
Jardine, Mr., 131.
Jay, 199.
"Jerky" hermit, a, 203, 204.
Johnson, C. S., 136.
Johnson, George, 136.
Jordan, David Starr, 49, 121, 296.
Junco, Sierra, 201.

K

Kaibab deer numerous, 296, 297.
Kansas plans to build and stock artificial lakes, 69, 70.
Katsuwonus vagans, 121.
Kee, Charlie, 183.
Kingfisher, and other birds, notes on the food of the western robin, 147, 148.
Western belted, 147.
Kite, white-tailed, 66.
Knowles, J., 244
Kocher, E. H., a meat eating trout, 67.
Kuser, Col. Anthony R., 48

L

Ladder, fish, 270.
Lake Miraflores, 17.
Lake Tahoe, fishing conditions in, 261–263.
Lambson, G. H., 42, 124, 170.
Land Economic Survey, 205.
Lang, Herbert, 122.
Lang, O. W., 142.
Law, deer, 271; enforcement, 113; federal and state governments cooperate to enforce game, 56, 57; new bulletin on fur issued, 52, 53; effect of the, prohibiting the taking of barracuda in California waters with purse seine or round haul nets, 18–25.
Legislation, fisheries statistics furnish basis for, 276.
Legislation, recent, 188–191.
Lencioni, Henry, 60, 288.
Leon, Jose, 141.
Leopold, Aldo, 280.
Lewis, E. H., 62.
Libby, Gretchen, 213.
Library, 292.
License fees, increased, hunting and fishing needed, 113, 114; increased fees provide for enlarged program, 192.
Deer tag, 269; have you a, 194.
Angling, 269.
Hunting, 269.
License, hunting and angling act, 190.
Life History Notes, 66–68, 146–149, 220–222, 294–296.
Lincoln, F. C., 131.
Linnet, 199, 201.
Lion, mountain, 123, 126, 192, 197, 202, 247, 272; control, 273.
Lippincott, Wm., doves, winter, in Siskiyou County, 221.
Littlejohn, George, 183.
Lobster, San Diego's, catch exceeds that of 1926, 141.
Louisiana rich in furbearers, 69.
Loungeway, L. W., 125.
Louse, 248.
Lovejoy, C. R., 284.
Lovekin, A. C., 49.
Lucas, H. C., 16.
Lucas, H. F., 54.
Lucy, Sir Thomas, 264.
Ludlum, Roy E., 63, 104.
Lumley, Judge, 136.
Lusitania, 218.
Lynn, C. R., 289.
Lynx, 284.

M

Maddox, C. F., 141; bagging broadbills in California waters, 259–261.
Madsen, D. H., 47, 131, 224.
Magladry, George, 136, 137, 277.
Mallard, 70, 98, 131, 146, 147, 153.
Mammal, fur bearing, 271.
Predatory, 248.
Manual, deputies receive new, 42.
Marlin, barred, 121; *See* swordfish.
Marten, 52, 207, 252, 284.
Martin, Irving, 107.
Maryland Conservationist, 129, 284.
Maryland, Smith vs., 15.
Mattingley, Arthur H. E., 282.
McAtee, W. L., 203, 207.
McCabe, C. A., 92.
McCloud, George, 168, 171, 173.
McClure, Tarpey vs., 5.
McFall, Hilda L., 115.
McHugh, R. E., 136.
McPherson, Mrs. 147.
Meat eating trout, a, 67.
Meigs, Avis, and Howe, Helen Y., food habits of trout, 148, 149.

Mendocino Lumber Company, 294.
Meyer, K. F., 61, 63.
Migration, 246.
  Bonitos in the North Pacific, of, 49.
Migratory Bird Treaty Act, 49, 52, 56, 195.
Migratory wild fowl in Mexico, 129.
Miller, Carl, 187.
Miller, Loye, the mountain sheep in the San Jacinto region, 67, 68.
Millions of hunters, 201.
Mink, 52, 69, 207, 272, 284, 297.
Minnow, 42.
Mississippi wild life refuge, 297.
Mitsukuri, Dr., 121.
Mixing faunas, 201.
Moffit, James, 53.
Monterey Fish Products Company, People vs., 3, 7, 8.
Moon, M. W., 220.
Moose, 53, 267.
Mother instinct, the, 98.
Mount Tamalpais refuge, 128.
Mountain lion control, 273.
Mountain sheep in the San Jacinto region, the, 67, 68.
Mouse, 236.
Mullet, 138.
Museum of Vertebrate Zoology, 124, 139, 202.
Muskrat, 52, 69, 191, 207, 225, 272, 284, 297.

N

National Automobile Club, 42.
National Forest, Kaibab, 296.
  Angeles, 133.
  Cleveland, 48, 133.
  Santa Barbara, 133.
  San Bernardino, 133.
National Game Conference, 118, 125, 131.
National Park, Grand Canyon, 297.
  Yellowstone, 284.
National Rabbit Federation, 285.
National Tariff Act, 54.
Natural history instruction in the schools, 195.
Natural resource, an unappreciated, 271, 272.
Nature her own physician, 99.
Naucrates ductor, 67.
Nelson, E. W., 49, 52, 123, 125, 130, 132.
Neothunnus catalinae, 121.
Neothunnus macropterus, 121.
Nets, purse seine or round haul, effect of the recent law prohibiting the taking of barracuda in California waters with, 18–25; declared legal, confiscation of, 119.
  Gill, 18, 21, 22, 23, 24, 25.
New bird book, a, 276.
New bird refuge and fur preserve in Alaska, 225.
New bird refuge created along Savannah River, South Carolina, 225.
New book on game bird propagation, a, 117.
New book on pheasants, 48, 49.
New bulletin on fur laws issued, 52, 53.
New commissioners appointed, 269.
New department of natural resources, 194.
New federal bird refuge created in Columbia River, 70.
New films of state game farm secured, 279.
New fish planting film secured, 54.
New Mexico increases refuge system, 69.
New refuge for Illinois, a, 222.
New salmon law, the, 275, 276.
Newsome, J. E., bringing back the quail, 66, 67.
Newsome, Ralph, 193, 211.
New tuna boat, a, 218.
New York State Fish, Game and Forest League, 56.
New York Zoological Society, 48.
Nidever, H. B., 109, 291.
Notes on the food of the western robin, kingfisher and other birds, 147, 148.
Novel type of duck refuge, a, 280.

O

Ober, E. H., 106, 287.
Occurrence of the Japanese herring, 141.
Ocean Industries, Incorporated, 17, 119.
Ocean Industries vs. California Fish and Game Commission, 54, 55.
O'Connell, John, 61, 286.
Odocoileus columbianus, 241.
  Columbianus columbianus, 241.
  Columbianus scaphiotus, 241.
  Hemionus Californicus, 245.
  Hemionus eremicus, 245.
  Hemionus hemionus, 245.
  Virginianus, 238.
  Virginianus macrourus, 239.
Ohio's auxiliary game refuges, 69.
O'Malley, Henry, 202.
Opossum, 52, 205, 207, 272, 297; depredations increasing, 127; reaches San Diego County, 146.
Oregon Sportsman, The, 69.
Oriole, 199.
O'Rourke, Zoological Institute, 221.
Osprey, American, 66.
Otter, 52, 69, 207.
  River, 272.
  Sea, 41.
Our ranch folks, 52.
Outlook, The, 218.
Ovis, canadensis nelsoni, 67.
Owl, 199.

P

Pacific Fisherman, 218.
Pacific Gas and Electric Company, 176, 177.
Paladini vs. Superior Court, 2, 5.
Paramecium, 43.
Parker, Pat, 104.
Partridge, 207, 285.
  European, 151.
  Hungarian, 27, 28, 82, 86, 92–96, 100, 119, 150, 152, 154, 155, 156.
Patrol, uniformed force, 127.
Paul G. Redington is named chief of Biological Survey, 131, 132.
Pearl essence in San Diego, 216, 217.
Pearson, T. Gilbert, 120.
Peau, Etienne, 70.
Pelican, white, 146.
Pendleton Game Farm, 93.
People vs. Monterey Fish Products Company, 3, 7, 8.
People vs. Stafford Packing Company, 5, 6.
People vs. Truckee Lumber Company, 5, 6.
Peralta, 13, 14, 15, 16, 17, 119.
Perch, 138.
Permanent improvements, 114.
Permanent wild life protection fund, 279.
Personnel file improved, 278.
Petersen, Charles, 183.
Petersen, Peter, 183.
Phalacrocorax ater, P. fuscescens, 282.
  Carbo, 282.
Pheasant, 63, 69, 80, 84, 99, 136, 140, 149, 150, 153, 154, 190, 192, 211, 292, 293; a new book on, 48, 49; planting of, 62; insect food for young, 116, 117; "Pheasant farming," 117; season disappointing, 117; fills need in Iowa, 118, 119; plantings, 197, 198; increasing in Nebraska, 223; a benefit, 275; safety for, 275.
  Chinese, 28, 86, 94, 117, 204; food habits of the, 184–187.
  English, 150.
  Mongolian, 82, 100.
  Ring-necked, 59, 61, 100, 153, 154, 201, 215, 275, 293.
  Silver, 65, 152.
Phoebe, 199.
Photographic evidence, 277.

Pierce, Wright M., Status of the golden eagle in southern California, 66.
Pigeon, 139.
Pike and trout, 42, 294.
Pike, ripple, 178.
Pilot fish, 67.
Pisobia minutilla, 148.
Pitts, George H., 183.
Plankton, 22.
Plans for increasing the duck supply, 195, 196.
Plantasticus migratorius propinquus, 147.
Planting in California, history of fish, 163–174.
Plover, 184.
Poachers and game law violators, 264–267.
Podilymbus podiceps, 147.
Pollution, 62, 69, 127, 139, 270.
Poole, N., 211.
Porcupine, 236.
Possible disease in mountain sheep, 222.
Post, Fred H., 60, 136, 193, 211.
Prairie Chicken, 119.
Pratt, M. B., 106.
Predictions of game abundance needed, 41.
President increases area of wild life reservation, 56.
Pritchard, H. I., 171.
Prix Magan d'Aubusson, 70.
Program, four-year, inaugurated, 269, 270.
Progress reported in West Virginia, 69.
Propagation, a new book on game birds, 117.
Propagation, game, in Washington, 204.
Proso, 61.
Protozoa, 43.
Ptychocheilus grandis, 294.
Oregonensis, 178.
Umpquae, 294.
Public shooting grounds, 114, 119, 189; and marsh land conservation bill, 47; suggested, 280, 281.

Q

Quail, 60, 80, 119, 150, 151, 153, 154, 181, 183, 184, 193, 197, 202, 207, 297; bringing back the, 66, 67; from Mexico, importation of, 117, 118; in New Zealand, California, 128; receive added protection, 197; vermin and, 205.
Bob-white, 27, 28, 150, 151, 205.
Valley, 58, 100, 215, 287.
Qualifications of a game keeper, 115, 116.
Quarles, E. A., 94, 115.
Queen, S. T., 205.

R

Rabbit, 41, 126, 150, 183, 184; bounty fails in Kansas, 128.
Brush, 190.
Cottontail, 60, 190, 201.
Rabbit farm, experimental, at Fontana, California, 285.
Raccoon, 52, 205, 207, 272, 284, 297.
Rail, 184.
Ransdell, K. J., 136.
Rat, 41.
Cotton, 205.
Ratfish or elephant fish, the, 220, 221.
Real enemy, the, 127, 128.
Recent legislation, 188–191.
Reckers, George B., 60.
Recreation, 128.
Redding, Mr., 96.
Redding, B. B., 164.
Redeke, Dr. H. C., 145.
Redhead, 131.
Redington, Paul G., is named chief of Biological Survey, 131–133.
Redman, Tom, 183.
Reduction, floating, factories, 281.
Reduction purposes, an historical review of the legal aspects of the use of food fish for, 1–18.
Reed, Hermann, 183.
Reedbirds or bobolinks no longer permitted to be killed, 208, 209.
Refrigeration, keeping small sardines firm by, 217.
Refuge, local game, 46; system, New Mexico increases, 69; Ohio's auxillary game, 69; created in Columbia River, new federal bird, 70; game, 69, 114, 191, 192, 269; for wildfowl, state, 119; Mount Tamalpais, 128; for Illinois, a new, 222; Idaho's game, 223; and fur preserve in Alaska, new bird, 225; created along Savannah river, South Carolina, new bird, 225; game, survey of, boundaries planned, 270; a novel type of duck, 280; state game requisites, 284, 285.
Mississippi wild life, 297.
Refuges d'oiseaux, 70.
Regulation of shooting devices discussed, 52.
Reindeer, 207; industry in Alaska, 55; industry promises to be important to Alaska, 130.
Relation of birds to forests, the, 203.
Relation of forests and forestry to human welfare, 128.
Renshaw, L. G., 246.
Requa, R. W., 170.
Reservation, president increases area of wild life, 56.
Revised hunting and trapping regulations issued for Alaska, 208.
Rhombus triacanthus, 218.
Rice, W. H., 277.
Rich, Willis H., 142.
Richards, W. W., 196, 271.
Ricketts, E. D., 211, 287, 288.
Riley, Smith, 279; insect food for young pheasants, 116, 117.
Roberts, H. C., 120.
Robertson, Judge, 279.
Robin, 60, 201.
Robin, kingfishers and other birds, notes on the food of the western, 147, 148.
Rodent, 236.
Rogers, Harry, 94.
Rogers State Game Farm, 154.
Roosevelt, Theodore, 50, 132.
Rounsefell, G. A., 142.
Rowe, Nicholas, 264.
Royal Institute of Fishery Research, 145.
Royal Italian Oceanographic Committee, 141, 145.
Ruddy, 146.
Rudolff, Hermann, 60, 122, 288.
Rule, A. E., 288.
Russell, Virgil G., pearl essence in California, 216, 217.

S

Sadler, R. J., 288.
Safety for pheasants, 275.
Safety screen to be installed at Lake Almanor, 50.
Sagehen, 215.
Saint Sure, A. F., 14, 54.
Salamander, 67.
Salmo criox, 296.
Fario, 296.
Henshawi, 261.
Trutta, 296.
Salmon, 47, 58, 59, 64, 107, 138, 139, 181, 190, 216, 288, 294; California, may feed off British Columbia coast, 43–45; the new law, 275, 276.
King, 120.
Parr, 47.
Sanctuary, on antarctic, 70.
San Diego's lobster catch exceeds that of 1926, 141.
Sandpiper, 184.
Least, 148.
Santa Barbara County Sportsmen's Club, 62.

Sardine, 2, 22, 61, 108, 109, 202, 213, 282; investigation, California, 143–145; small, keeping firm by refrigeration, 217; industry, the, 218, 219.
Monterey, 26.
Saturday Evening Post, 123.
Savage, Carmi, 288.
Sawyer, Edmund J., 284.
Scaly leg, 83.
Scaup, 146, 183.
School of Field Natural History, 275.
Science, 47, 49, 52.
Science, Service, 281.
Scientific data secured by lion hunter Bruce, 123, 124.
Scofield, E. C., 142.
Scofield, N. B., 105, 142; the department of commercial fisheries, 107–110; commercial fishery notes, 141–146, 216–219.
Scofield, W. L., 145.
Scout service to wild life, 279, 280.
Screen, fish, 190, 270.
Screen, safety, to be installed at Lake Almanor, 50.
Scripps Institution of Oceanography, 142.
Seal, 184, 291.
Sea Lion, 190, 290, 291; what do eat? 119–120.
Season, Idaho's open, 224.
Season, rutting, 236.
Second annual convention of employees of the California Fish and Game Commission, 102–107.
Secundodoralis, 121.
Sella, Dr. Massimo, 141.
Selle, W. A., 142.
Sellmer, W. B., 60, 103, 117, 122, 128, 136, 184, 278, 286, 288.
Serials newly acquired by the California State Fisheries Laboratory, 145.
Service Bulletin, 140.
Seton, Ernest Thompson, 240.
Sette, O. E., 138, 144.
Shad, 138, 164; in Oregon, 279.
Shanklin, J. W., 136.
Sharp, Joe, 183.
Shearin, J. W., 60, 136.
Shebley, W. H., 59, 105; ayu eggs imported, 42, 43; history of fish planting in California, 163–174; four new hatcheries for California, 174–180.
Sheep, mountain, 69, 106; in the San Jacinto region, the, 67, 68; possible disease in, 222.
Shoveller, 146.
Show, Stewart B., 105, 132.
Shrimp, 282.
Sibeck, Charles, 211.
Simpson, Gene M., 79, 117; we must produce if we would destroy, 92–96.
Skogsberg, Tage, 291.
Skunk, 52, 69, 104, 207, 272, 284, 297.
Slides, educational films and lantern, of the California Fish and Game Commission, 36–40.
Smalley, Edward, 171.
Smelt, 291.
Smith, George, 104.
Smith, Hugh M., 109.
Smith vs. Maryland, 15.
Snake, black, 205.
Snow, Sidney, 287.
Some resolutions of the Western Fish and Game Commissioners' Association, 47.
Something more than protection, 42.
Sparrow, English, 41.
Gambel, 201.
White crested, 199.
Golden crested, 199.
Spearfish, 122.
Specifications for state game preserves, 204, 205.
Spencer, Jack, 48, 65, 105.
Spickard, C. R., 115.
Spoonbill, 131.
Sport for the angler in San Francisco Bay, 198, 199.
Spot whales by airplane, 50.
Squirrel, 126.
Gray, 41.
Tree, 189; in the Laguna Mountains to receive winter food supply, 48.
Stafford Packing Company, 2.
Stafford Packing Company, People vs., 5, 6.
Stanislaus National Forest, 125.
Starks, Edwin C., 67.
State Board of Health, 270.
State Fair Exhibit, 278.
State game refuge requisites, 284, 285.
State Mining Bureau, 194.
State refuges for wildfowl, 119.
Station, collecting, Klamathon Salmon egg, 135.
Status of the golden eagle in Southern California, 66.
Steele, Mr., 108.
Stephens, Albert Lee, 11.
Stickleback, 47.
Stilt, Black-necked, 147.
Stoddard, Herbert L., 205.
Stone, George, 274.
Stone, Dr. Livingston, 164, 165.
Storm damage, 124.
Striped bass gaining in public favor, 284.
Striped bass in Maryland, 129.
Sturgeon, 41.
Suit, service, 135.
Summer resort educational work, 273–275.
Sunfish, blue-gilled, 59.
Superior Court, Paladini vs., 2–5.
Survey of duck conditions planned, 125, 126.
Survey of game refuge boundaries planned, 270.
Sutten, Jim, 183.
Swan, 183, 207.
Trumpeter, survives, 284.
Swordfish, varieties of tunnies and, described, 121, 122.
Broadbill, 121; bagging broadbills in California waters, 259–261.
Marlin, 121.

T

Talavera, Florencio, 142.
Tariff Commission, 118.
Tarpey vs. McClure, 5.
Taxidae, 220.
Teal, cinnamon, 131, 183.
Green-winged, 131, 183.
Tern, the food of, in England, 206–207.
Thacker, C. F., 205.
Thompson, George, 60.
Thompson, Ruth Miller, interesting books on fish, fisheries and related subjects, 29–35; California sardine investigations, 143–145; visitors, 142–143; serials newly acquired by the California state fisheries laboratory, 145.
Thompson, Will F., 109, 142, 143, 144.
Throckmorton, S. R., 164, 165.
Thunnus saliens, 121.
Thynnus, 121.
Tick, 248.
Tiger, 273.
Time element important in conservation, 41.
Tinamou, 118; Argentina prohibits the exportation of, 120.
Toms, Webb, 171.
Tortoise, 282.
Towhee, 52.
California, 201.
Trappers' catch, value of, 272.
Treat, Fred A., 13, 119.
Tree squirrels in the Laguna mountains to receive winter food supply, 48.
Trial shipment of fish from the Atlantic coast, 218–219.

Trout, 58, 127, 139, 178, 181, 190, 197, 202, 261, 278,; pike and, 42, 294; a meat eating, 67; food habits of, 148–149.
Black-spotted, 168.
Domestic, 189.
Eastern brook, 59, 136, 164; planted in Moraine Lake, Tulare County, 129–130; food of, 148.
European, 273; gets older scientific name, 296.
Golden, 190.
Mackinaw, 44, 262, 263, 290.
Rainbow, 59, 67, 168, 169; food of, 148.
Steelhead, 263; better protection for, needed, 47.
Tahoe, 262.
Truckee Lumber Co., vs. People, 5, 6.
Tuna, 49, 108, 109, 290; hooks found in albacore and, wanted, 141; boat, a new, 218.
Blue-fin, 23, 24.
Leaping, 121.
Yellowfin, 121.
Tunnies and swordfishes, varieties of, described, 121–122.
Tunny, European, 121.
Turkey, ocellated, 118.
Virginia wild, 93, 95.
Wild, 96, 126, 152, 207.
Two sides of a question, 46.

U

Unified plan for elk conservation, 208.
United Duck Hunters, 125.
United States Bureau of Biological Survey, 52, 56, 70, 86, 123, 125, 130, 207, 208, 225, 286, 297.
United States Bureau of Fisheries, 64, 109, 110, 138, 142, 144, 216, 279, 297.
United States Department of Agriculture, 41, 47, 52, 56, 70, 116, 201.
United States Forest Service, 297.
United States Tariff Commission, 54.
Upper Mississippi River Wild Life and Fish Refuge, 56, 297.
Ursus americanus, 202.

V

Value of the trappers' catch, 272; of wildfowl, 125.
Van Camp Fish Market, 217.
Van Camp Sea Food Co., Inc., vs. Fish and Game Commission, 11.
Van Deventer, W. C., 142.
Van Dyke, T. S., 242.
Van Osdoll, Virginia, 199.
Vaughan, M. T., 288.
Vaughn, Bob, 255.
Vermin, and quail, 205; classification of, 125.
Viewpoint of an onlooker, 110–112.
Violator, poachers and, game law, 264–267.
Visalia Delta, 199.
Visitors, 142–143.
Vissiere, J. P., 211.
Von Arx, V. E., 60.
Vore, Frank H., 214.

W

Walters, C. J., 228.
Wanted: Hooks found in albacore and tuna, 14.
Wapiti, 237.
Warbler, 199, 297.
Warden, do you know your game, 194–195; viewpoint, 45; job a dangerous one, 46.
Dollar-a-year, 60, 96–98, 287.
U. S. Game, 57.
Washington State Association of County Game Commissioners, 92.
Watkins, Rolin G., 65, 107, 214.
Waxwing, 199.
Weasel, 272, 284.
We must produce if we would destroy, 92–96.
Weeds or wildfowl, 45–46.
Welch, Walter R., 60, 103, 212; dollar-a-year wardens, 96–98; hunting and fishing reminiscences, 180–184; poachers and game law violators, 264–267.
Werder, Louis, 183.
Western duck fund, 126.
Western, some resolutions of fish and game commissioners' association, 47.
Western Power Company, 50.
Whales, spot, by airplane, 50.
Whaling, operations start in southern California waters, 46–47.
Whitehead, S. S., 142; keeping small sardines firm by refrigeration, 217; pilot fish, 67.
Wildfowl, migratory, in Mexico, 129; heavy losses result of reduced water areas, 130–131; the value of, 125.
Wild Life and Conservation, 280.
Wild life, scout service to, 279–280.
Willard, A. H., 136.
Willet, 184.
Wilson, C. S., 275.
Wilson, Thomas, 183.
Wolverine, 248, 272.
Woodbury, J. G., 164, 165, 166, 169.
Wood duck, 153.
Worse than a crime—a mistake, 126.
Wren, 52, 199.
Wright, George M. and Dixon, Joseph, annual census of waterfowl at Lake Merritt, Oakland, California, 146.
Wythe, Margaret W., 202.

X

Xiphias gladius, 259.

Y

Yellowleg, 184.
Lesser, 208.
Yellowtail, 23, 25.
Yosemite Museum, 148.
Young, C. C., 269.
Young, Lee, 284.

Z

Zambarlin, Andrew, 119.
Zellerbach, I., 103, 107, 269.

54549 10-27 9500

CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

Volume 13 Sacramento, January, 1927 Number 1

49000

BOARD OF FISH AND GAME COMMISSIONERS.

San Francisco, California.

Commissioners appointed by the Governor, by and with the consent of the Senate. Term at pleasure of Governor. No compensation.

I. ZELLERBACH, President.....San Francisco
M. J. CONNELL, Commissioner.....Los Angeles
RALPH H. CLOCK, Commissioner.....Long Beach
B. D. MARX GREENE, Executive Officer and Attorney.....San Francisco
J. S. Hunter, Assistant Executive Officer and Chief of Patrol.....San Francisco
Mrs. P. A. Ford, Assistant to Executive Officer.....San Francisco
Ralph W. Scott, Assistant Attorney.....San Francisco

Postal Telegraph Building, San Francisco. Phone Sutter 6100.

DEPARTMENT OF FISH CULTURE.

W. H. SHEBLEY, In Charge Fish Culture.....Sacramento
E. W. Hunt, Field Superintendent.....Sacramento
A. E. Doney, Fish Ladder Inspector.....Sacramento
A. E. Culver, Screen Inspector.....Sacramento
G. H. Lambson, Superintendent Mt. Shasta Hatchery and Klamath River Stations.....Mt. Shasta
E. V. Cassell, Foreman in Charge Fall Creek Hatchery.....Copco
L. J. Stinnett, Foreman in Charge Bogus Creek Station.....Copco
Guy Tabler, Foreman in Charge Wawona Hatchery.....Wawona
Chas. L. Frame, Foreman in Charge Brookdale Hatchery.....Brookdale
J. C. Lewis, Foreman in Charge Fort Seward Hatchery.....Alderpoint
J. W. Ricker, Foreman in Charge Ukiah Hatchery.....Ukiah
J. Shebley, Foreman in Charge Feather River Hatchery.....Clio
Ed. Clessens, Foreman in Charge Kaweah Hatchery.....Hammond
D. A. Clanton, Foreman in Charge Bear Lake Hatchery.....Bear Lake
L. Phillips, Superintendent of Car No. 01.....Mt. Shasta
Ross McCloud, Superintendent of Car No. 02.....Mt. Shasta

DEPARTMENT OF COMMERCIAL FISHERIES.

N. B. SCOFIELD, In Charge Commercial Fisheries.....San Francisco
H. B. Nidever, Assistant in Charge.....San Pedro
S. H. Dado, Assistant in Charge.....San Francisco
R. L. Classic, Assistant in Charge.....Monterey
Coburn E. Maddox, Assistant in Charge.....San Diego
W. L. Scofield, Acting Head State Fisheries Laboratory.....San Pedro
W. F. Thompson, Consultant, State Fisheries Laboratory.....San Pedro

BUREAU OF FINANCE AND ACCOUNTS.

H. R. DUNBAR, Assistant Executive Officer and in Charge.....Sacramento

BUREAU OF EDUCATION AND RESEARCH.

DR. H. C. BRYANT, In Charge.....San Francisco
Rodney S. Ellsworth, Assistant.....San Francisco

BUREAU OF PUBLICITY.

ROLIN G. WATKINS, In Charge.....San Francisco

BUREAU OF GAME FARMS.

AUGUST BADE, In Charge.....Yountville

BUREAU OF HYDRAULICS.

(Screens, Ladders and Pollution.)

JOHN SPENCER, In Charge.....San Francisco

BUREAU OF STATISTICS AND GAME PROBLEMS.

R. E. LUDLUM, In Charge.....San Francisco
Robt. J. Irvine, Chemist.....San Francisco

PATROL SERVICE.

J. S. HUNTER, Assistant Executive Officer and Chief of Patrol.

S. R. Briggs, Assistant Chief of Patrol.

M. S. CLARK—San Francisco Office
C. L. Bundock—San Francisco Office
J. L. Bundock—Oakland
C. M. Bouton—San Rafael
Jack Burke—Daly City
E. R. Caldwell—San Francisco
T. K. Duncan—Concord
C. E. Holladay—Morgan Hill
I. L. Koppel—San Jose
Bert F. Laws—San Francisco
E. V. Moody—Santa Cruz
J. P. Vissiere—Watsonville
C. S. BAUDER—Los Angeles Office
*E. H. Ober—Big Pine
*E. D. Ricketts—Los Angeles Office
E. A. Chan—Santa Ana
La Rue Chappell—Los Angeles Office
R. J. Sadler—Los Angeles Office
Carmi Savage—Los Angeles Office
W. C. Talbott—Los Angeles Office
C. J. Walters—Independence
C. S. Donham—Riverside
Walter Emerick—Ventura
E. H. Glidden—San Diego
J. H. Gyger—Perris
R. J. Little—Banning
W. C. Malone—San Bernardino
Webb Toms—San Diego
Albert Veil—Los Angeles Office
D. E. ROBERTS—Sacramento Office
W. J. Black—Rio Vista
G. I. Fleckenstein—Folsom
Euell Gray—Placerville
Nelson Poole—Sacramento Office
R. C. O'Connor—Grass Valley
John O'Connell—Stockton
Chas. Sibeck—Galt
R. L. Sinkey—Woodland
K. P. ALLRED—Eureka
T. M. Benson—Fortuna
McPherson Lough—Eureka
WM. LIPPINCOTT—Yreka
J. F. French—Alturas
S. R. Gilloon—Mount Shasta
F. A. Greene—Redding
Fred R. Starr—Macdoel
S. J. CARPENTER—Maxwell
Harry N. Brittan—Red Bluff
L. W. Dinsdale—Woodland
B. L. Hammack—Maxwell
R. C. Marshall—Maxwell
Wm. C. Raffetto—Maxwell
J. V. Shearin—Stonyford
A. J. Stanley—Stirling City
Geo. Thompson—Gridley
HENRY LENCIONI—Santa Rosa
J. H. Groves—Cloverdale
Victor E. Von Arx—Cazadero
JOS. H. SANDERS—Truckee
C. O. Fisher—Susanville
J. E. NEWSOME—Newman
L. W. Longeway—Sonora
Geo. Magladry—Modesto
H. I. Pritchard—Atwater
Geo. Smalley—Madera
E. W. SMALLEY—Hanford
O. P. Brownlow—Porterville
F. A. Bullard—Dunlap
Ray C. Ellis—Fresno
C. B. Tibbetts—Kernville

UNATTACHED.

Wm. Armstrong—Vallejo
H. E. Black—San Luis Obispo
J. H. Hellard—Willits
J. H. Hill—Hollister
Ovid Holmes—Fort Bragg
Geo. N. Johnson—Napa
G. O. Laws—Weaverville
Ralph Newsome—King City
Fred H. Post—Salinas
H. S. Prescott—Crescent City
K. J. Ransdell—Ukiah
W. B. Sellmer—Fairfax
A. H. Willard—Rocklin
J. D. Dondero—Lakeport

LAUNCH PATROL.

Charles M. Bouton—Launch "Quinnat," San Rafael
John O'Connell—Launch "Rainbow," Stockton

STATE LION HUNTER.

Jay C. Bruce—San Lorenzo

Captains indicated in capitals.
*Patrol Lieutenants.

1925 ABSTRACT CALIFORNIA FISH AND GAME LAWS 1926

WHITE SQUARES INDICATE OPEN SEASON — NUMBERS IN SQUARES ARE OPEN DATES

THIS ABSTRACT WILL BE VALID UNTIL 90 DAYS AFTER ADJOURNMENT OF THE 1927 LEGISLATIVE SESSION

	DISTRICTS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT	NOV.	DEC.	BAG AND POSSESSION LIMITS, ETC.
DEER	1-1½-4½ 22-24-25-26										15			No Does, Fawns or Spike Bucks Nor Forked Horned Muledeer in Dist. 1¾ No sale of Venison or Deer Skins Two Bucks per Season. See Notes 8-9-10-14-15-16
	1¾									15	15			
	2-2½-3									14				
	4-4½									16	15			
Rabbits—Cottontail and Brush	ALL													15 per day. 30 per week No limit in District 4
Tree Squirrels	ALL													Closed until September 1st, 1927
Elk, Antelope, Mountain Sheep, Sea Otter, Beaver*	ALL													Killing of Elk or possession of Elk meat a felony $1,000 fine for Sea Otter
Bear, Fur Animals	ALL										15			See Notes 11-12
Ducks, Geese, Jack Snipe, Mud Hens	ALL	15												See Notes 4-14-15-16
Rail, Wood Duck, Wild Pigeon, Shore Birds (Except Jack Snipe)	ALL													
Quail—Valley, Desert and Mountain	ALL EXCEPT 1¾													Valley and Desert 15 per day. 30 per week Mountain 10 per day. 20 per week
	1¾													
Sage Hen	ALL								15					4 per day. 8 per week
Dove	ALL Except 4-4½-4¾													15 per day. 30 per week
	4-4½-4¾													
Grouse	ALL									15	14			4 per day. 8 per week
Pheasant	4¾												7	6 per season
Trout (Except Golden), Whitefish	1-1¾-2-3 4-4¾ Lake Alpine													Bag limit for taking and possession, 25 trout or 10 pounds and one trout or one trout weighing 10 pounds or over per day — For other restrictions See Notes 19-20-24 36-37-39 40-42 On this Card
	2½		14											
	23-24-25					30								
	See Notes 25-26													
	1¾ Winter													Bag limit for taking and possession, 5 trout regardless of weight per day
	2-3-10 Tule Water												15	
	2-2½-10 Spoon													Bag limit for taking and possession, 1 trout per day
Golden Trout	ALL						30				1			20 per day. None under 5 inches
Black Bass, Sacramento Perch and Crappie SEE NOTE 44 FOR DISTRICT 4¾	ALL													25 per day — No Black Bass under 7 ins.
	Clear Lake in Lake Co.													Clear Lake 10 per day — No sale Hook and line only
Sunfish	ALL													25 per day. Hook and line only
Striped Bass, Shad	ALL													See Note 23
Salmon	15						15							See Note 27 for other districts, limit etc.
Crabs	ALL							30					15	See Note 28
Abalones	ALL	14			16									See Note 33
Pismo Clams	17													See Note 32
Spiny Lobster	ALL										15			See Note 28

LICENSE PROVISIONS

HUNTING LICENSE — License Year July 1 to June 30
Residents, $1.00. Non-Residents, $10.00 Declarant Aliens, $10.00. Other Aliens, $25.00.

ANGLING LICENSE — License Year January 1 to December 31
Residents, $1.00. Non-Residents, $3.00. Aliens, $3.00.
No angling license required of those under 18 years of age.

TRAPPING LICENSE — License Year July 1 to June 30
Citizens, $1.00. Aliens, $2.00 Under 18 no license.

CALIFORNIA STATE PRINTING OFFICE
CHARLES A. WHITMORE, State Printer
SACRAMENTO, 1927

CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

Volume 13 Sacramento, April, 1927 Number 2

GAME PROPAGATION NUMBER.

50629

BOARD OF FISH AND GAME COMMISSIONERS.

San Francisco, California.

Commissioners appointed by the Governor, by and with the consent of the Senate. Term at pleasure of Governor. No compensation.

I. ZELLERBACH, President.....San Francisco
M. J. CONNELL, Commissioner.....Los Angeles
RALPH H. CLOCK, Commissioner.....Long Beach
B. D. MARX GREENE, Executive Officer and Attorney.....San Francisco
Mrs. P. A. Ford, Assistant to Executive Officer.....San Francisco
Ralph W. Scott, Assistant Attorney.....San Francisco

Postal Telegraph Building, San Francisco. Phone Sutter 6100.

DEPARTMENT OF FISH CULTURE.

W. H. SHEBLEY, In Charge Fish Culture.....Sacramento
E. W. Hunt, Field Superintendent.....Sacramento
A. E. Doney, Fish Ladder Inspector.....Sacramento
A. E. Culver, Screen Inspector.....Sacramento
G. H. Lambson, Superintendent Mt. Shasta Hatchery and Klamath River Stations.....Mt. Shasta
E. V. Cassell, Foreman in Charge Fall Creek Hatchery.....Copco
Guy Tabler, Foreman in Charge, Yosemite and Wawona Hatcheries.....Yosemite
Chas. L. Frame, Foreman in Charge Brookdale Hatchery.....Brookdale
J. C. Lewis, Foreman in Charge Fort Seward Hatchery.....Alderpoint
J. W. Ricker, Foreman in Charge Ukiah Hatchery.....Ukiah
J. Shebley, Foreman in Charge Feather River Hatchery.....Clio
Ed. Clessens, Foreman in Charge Kaweah Hatchery.....Hammond
Geo. McCloud, Superintendent Mt. Whitney Hatchery.....Independence
Geo. E. West, Superintendent Tahoe Hatchery.....Tahoe
F. F. Anderson, Superintendent Domingo Springs Hatchery.....Westwood
D. A. Clanton, Foreman in Charge Bear Lake Hatchery.....Pine Knot
L. Phillips, Superintendent of Car No. 01.....Mt. Shasta
Ross McCloud, Superintendent of Car No. 02.....Mt. Shasta

DEPARTMENT OF COMMERCIAL FISHERIES.

N. B. SCOFIELD, In Charge Commercial Fisheries.....San Francisco
H. B. Nidever, Assistant.....San Pedro
S. H. Dado, Assistant.....San Francisco
R. L. Classic, Assistant.....Monterey
Coburn E. Maddox, Assistant.....San Diego
W. L. Scofield, Acting Director State Fisheries Laboratory.....San Pedro
W. F. Thompson, Consultant, State Fisheries Laboratory.....San Pedro

BUREAU OF FINANCE AND ACCOUNTS.

H. R. DUNBAR, Assistant Executive Officer and in Charge.....Sacramento

BUREAU OF EDUCATION AND RESEARCH.

DR. H. C. BRYANT, In Charge.....San Francisco
Rodney S. Ellsworth, Assistant.....San Francisco

BUREAU OF PUBLIC RELATIONS.

FRANK H. VORE, In Charge.....San Francisco

BUREAU OF GAME FARMS.

AUGUST BADE, In Charge.....Yountville

BUREAU OF HYDRAULICS.

(Screens, Ladders and Pollution.)

JOHN SPENCER, In Charge.....San Francisco
Clarence Elliger, Assistant.....San Francisco

BUREAU OF STATISTICS AND GAME PROBLEMS.

R. E. LUDLUM, In Charge.....San Francisco
Robt. J. Irvine, Chemist.....San Francisco

PATROL SERVICE.

J. S. HUNTER, Chief of Patrol.

S. R. Briggs, Assistant Chief of Patrol.

O. P. BROWNLOW—San Francisco Office
In Charge, Fish Planting
M. S. CLARK—San Francisco Office
C. L. Bundock—San Francisco Office
J. L. Bundock—Oakland
C. M. Bouton—San Rafael
Jack Burke—Daly City
E. R. Caldwell—San Francisco Office
T. K. Duncan—Concord
C. E. Holladay—Morgan Hill
I. L. Koppel—San Jose
Bert F. Laws—San Rafael
E. V. Moody—Santa Cruz
C. S. BAUDER—Los Angeles Office
*E. H. Ober—Big Pine
*E. D. Ricketts—Los Angeles Office
E. A. Chan—Santa Ana
La Rue Chappell—Los Angeles Office
C. S. Donham—Fawnskin
Walter Emerick—Ventura
E. H. Glidden—San Diego
J. H. Gyger—Perris
R. J. Little—Markleeville
W. C. Malone—San Bernardino
R. J. Sadler—Fawnskin
Carmi Savage—Los Angeles Office
W. C. Talbott—Markleeville
C. J. Walters—Independence
Webb Toms—San Diego
Albert Veil—Los Angeles Office
D. E. ROBERTS—Sacramento Office
W. J. Black—Rio Vista
L. W. Dinsdale—Murphy
G. I. Fleckenstein—Folsom
Euell Gray—Placerville
R. C. O'Connor—Grass Valley
John O'Connell—Stockton
Nelson Poole—Sacramento Office
Wm. C. Raffetto—Sacramento Office
Chas. Sibeck—Galt
R. L. Sinkey—Woodland
A. H. Willard—Rocklin
WM. LIPPINCOTT—Yreka
J. F. French—Alturas
S. R. Gilloon—Mount Shasta
F. A. Greene—Redding
B. L. Hammack—Fort Jones
Fred R. Starr—Macdoel
S. J. CARPENTER—Maxwell
Harry N. Brittan—Red Bluff
J. V. Shearin—Stonyford
A. J. Stanley—Chico
Geo. Thompson—Gridley
HENRY LENCIONI—Santa Rosa
J. H. Groves—Cloverdale
Victor E. Von Arx—Cazadero
JOSEPH H. SANDERS—Truckee
C. J. Barnes—Portola
C. O. Fisher—Susanville
J. E. NEWSOME—Newman
L. W. Longeway—Sonora
Geo. Magladry—Modesto
H. I. Pritchard—Atwater
Geo. R. Smalley—Madera
E. W. SMALLEY—Hanford
F. A. Bullard—Dunlap
Ray C. Ellis—Fresno
Wm. T. Smalley—Visalia
C. B. Tibbetts—Kernville
K. P. ALLRED—San Luis Obispo
H. E. Black—San Luis Obispo
J. H. Hill—Hollister
Ralph Newsome—King City
Fred H. Post—Salinas
J. P. Vissiere—Watsonville

UNATTACHED.

Wm. Armstrong—Vallejo
Earl P. Barnes—Eureka
T. M. Benson—Fortuna
J. H. Hellard—Willits
Ovid Holmes—Fort Bragg
Geo. N. Johnson—Napa
G. O. Laws—Weaverville
McPherson Lough—Eureka
R. C. Marshall—Douglas City
H. S. Prescott—Crescent City
K. J. Ransdell—Ukiah
W. B. Sellmer—Fairfax
J. D. Dondero—Lakeport

LAUNCH PATROL

Charles M. Bouton—Launch "Quinnat," San Rafael
John O'Connell—Launch "Rainbow," Stockton
Wm. Armstrong—Launch "Hunter," Vallejo

STATE LION HUNTER

Jac C. Bruce—San Lorenzo

Captains indicated in capitals.
*Patrol Lieutenants.

1925 ABSTRACT CALIFORNIA FISH AND GAME LAWS 1926

WHITE SQUARES INDICATE OPEN SEASON — NUMBERS IN SQUARES ARE OPEN DATES

THIS ABSTRACT WILL BE VALID UNTIL 90 DAYS AFTER ADJOURNMENT OF THE 1927 LEGISLATIVE SESSION

	DISTRICTS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT	NOV.	DEC.	BAG AND POSSESSION LIMITS, ETC.
DEER	1-1½-4½ 23-24-25-26										15			No Does, Fawns or Spike Bucks Nor Forked Horned Muledeer in Dist. 1½ No sale of Venison or Deer Skins Two Bucks per Season. See Notes 8-9-10-14-15-16
	1½									15	15			
	2-2½-3								14					
	4-4½								16	15				
Rabbits—Cottontail and Brush	ALL													15 per day. 30 per week No limit in District 4
Tree Squirrels	ALL													Closed until September 1st, 1927
Elk, Antelope, Mountain Sheep, Sea Otter, Beaver*	ALL													Killing of Elk or possession of Elk meat a felony $1,000 fine for Sea Otter
Bear, Fur Animals	ALL										15			See Notes 11-12
Ducks, Geese, Jack Snipe, Mud Hens	ALL	15												See Notes 4-14-15-16
Rail, Wood Duck, Wild Pigeon, Shore Birds (Except Jack Snipe)	ALL													
Quail—Valley, Desert and Mountain	ALL EXCEPT 1½													Valley and Desert 15 per day. 30 per week Mountain 10 per day. 20 per week
	1½													
Sage Hen	ALL								15					4 per day. 8 per week
Dove	ALL Except 4-4½-4½													15 per day. 30 per week
	4-4½-4½													
Grouse	ALL									15	14			4 per day. 8 per week
Pheasant	4½												7	6 per season
Trout (Except Golden), Whitefish	1-1½-2-3 4-4½ Lake Almanor													Bag limit for taking and possession, 25 trout or 10 pounds and one trout or one trout weighing 10 pounds or over per day — For other restrictions See Notes 19-20-24 36-37-39 40-42 On this Card
	2½		14											
	23-24-25					30								
	See Notes 25-26													
	1½ Winter													
	2-3-10 This Water												15	Bag limit for taking and possession, 5 trout regardless of weight per day
	2-2½-10 Spear													Bag limit for taking and possession, 1 trout per day
Golden Trout	ALL						30				1			20 per day. None under 5 inches
Black Bass, Sacramento Perch and Crappie SEE NOTE 44 FOR DISTRICT 4½	ALL													25 per day — No Black Bass under 7 ins.
	Clear Lake in Lake Co.													Clear Lake 10 per day — No sale Hook and line only
Sunfish	ALL													25 per day. Hook and line only
Striped Bass, Shad	ALL													See Note 23
Salmon	15						15							See Note 27 for other districts, limit etc.
Crabs	ALL							30				15		See Note 28
Abalones	ALL	14		16										See Note 33
Pismo Clams	17													See Note 32
Spiny Lobster	ALL										15			See Note 28

LICENSE PROVISIONS

HUNTING LICENSE — License Year July 1 to June 30
Residents, $1.00. Non-Residents, $10.00 Declarant Aliens, $10.00. Other Aliens, $25.00.

ANGLING LICENSE — License Year January 1 to December 31
Residents, $1.00. Non-Residents, $3.00. Aliens, $3.00.
No angling license required of those under 18 years of age.

TRAPPING LICENSE — License Year July 1 to June 30
Citizens, $1.00. Aliens, $2.00 Under 18 no license.

CALIFORNIA STATE PRINTING OFFICE
CHARLES A. WHITMORE, State Printer
SACRAMENTO, 1927

CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

Volume 13 Sacramento, July, 1927 Number 3

52683

DEPARTMENT OF NATURAL RESOURCES.

DIVISION OF FISH AND GAME.

Sacramento, California.

Commissioners appointed by the Governor. Term at pleasure of Governor.

No compensation.

I. ZELLERBACH, President.....San Francisco
M. J. CONNELL, Commissioner.....Los Angeles
RALPH H. CLOCK, Commissioner.....Long Beach
B. D. MARX GREENE, Executive Officer and Attorney.....San Francisco
Mrs. P. A. Ford, Assistant to Executive Officer.....San Francisco
Ralph W. Scott, Assistant Attorney.....San Francisco
Walter Welch, Field Assistant.....San Francisco
Postal Telegraph Building, San Francisco. Phone Sutter 6100.

DEPARTMENT OF FISH CULTURE.

W. H. SHEBLEY, In Charge Fish Culture.....Sacramento
E. W. Hunt, Field Superintendent.....Sacramento
A. E. Doney, Fish Ladder Inspector.....Sacramento
A. E. Culver, Screen Inspector.....Sacramento
G. H. Lambson, Superintendent Mt. Shasta Hatchery and Klamath River Stations.....Mt. Shasta
E. V. Cassell, Foreman in Charge Fall Creek Hatchery.....Copco
Guy Tabler, Foreman in Charge, Yosemite and Wawona Hatcheries.....Yosemite
Chas. L. Frame, Foreman in Charge Brookdale Hatchery.....Brookdale
J. C. Lewis, Foreman in Charge Fort Seward Hatchery.....Alderpoint
J. W. Ricker, Foreman in Charge Ukiah Hatchery.....Ukiah
J. Shebley, Foreman in Charge Feather River Hatchery.....Clio
Ed. Clessens, Foreman in Charge Kaweah Hatchery.....Hammond
Geo. McCloud, Superintendent Mt. Whitney Hatchery.....Independence
Geo. E. West, Superintendent Tahoe Hatchery.....Tahoe
F. F. Anderson, Superintendent Domingo Springs Hatchery.....Westwood
D. A. Clanton, Foreman in Charge Bear Lake Hatchery.....Pine Knot
L. Phillips, Superintendent of Car No. 01.....Mt. Shasta
Ross McCloud, Superintendent of Car No. 02.....Mt. Shasta

DEPARTMENT OF COMMERCIAL FISHERIES.

N. B. SCOFIELD, In Charge Commercial Fisheries.....San Francisco
H. B. Nidever, Assistant.....San Pedro
S. H. Dado, Assistant.....San Francisco
R. L. Classic, Assistant.....Monterey
Coburn E. Maddox, Assistant.....San Diego
W. L. Scofield, Acting Director State Fisheries Laboratory.....San Pedro
W. F. Thompson, Consultant, State Fisheries Laboratory.....San Pedro

BUREAU OF FINANCE AND ACCOUNTS.

H. R. DUNBAR, Assistant Executive Officer and in Charge.....Sacramento

BUREAU OF EDUCATION.

DR. H. C. BRYANT, In Charge.....San Francisco
Rodney S. Ellsworth, Assistant.....San Francisco

BUREAU OF PUBLIC RELATIONS.

FRANK H. VORE, In Charge.....San Francisco

BUREAU OF GAME FARMS.

AUGUST BADE, In Charge.....Yountville

BUREAU OF HYDRAULICS.

(Screens, Ladders and Pollution.)

JOHN SPENCER, In Charge.....San Francisco
Clarence Elliger, Assistant.....San Francisco

BUREAU OF RESEARCH.

R. E. LUDLUM, In Charge.....San Francisco
Robt. J. Irvine, Chemist.....San Francisco

PATROL SERVICE.

J. S. HUNTER, Chief of Patrol—San Francisco
S. R. Briggs, Assistant to Chief—San Francisco
M. S. Clark, Assistant Chief of Patrol for Northern California—San Francisco
C. S. Bauder, Assistant Chief of Patrol for Southern California—Los Angeles
O. P. Brownlow, Captain, In Charge Fish Planting—San Francisco

C. L. Bundock—San Francisco Office
J. L. Bundock—Oakland
C. M. Bouton—San Rafael
Jack Burke—Daly City
E. R. Caldwell—San Francisco Office
T. K. Duncan—Concord
C. E. Holladay—Morgan Hill
I. L. Koppel—San Jose
Bert F. Laws—San Rafael
E. V. Moody—Santa Cruz
E. H. OBER—Big Pine
E. D. RICKETTS—Los Angeles Office
E. A. Chan—Santa Ana
La Rue Chappell—Los Angeles Office
C. S. Donham—Fawnskin
Walter Emerick—Ventura
E. H. Glidden—San Diego
J. H. Gyger—Perris
R. J. Little—Markleeville
W. C. Malone—San Bernardino
R. J. Sadler—Fawnskin
Carmi Savage—Los Angeles Office
W. C. Talbott—Markleeville
C. J. Walters—Independence
Webb Toms—San Diego
Albert Veil—Los Angeles Office
D. E. ROBERTS—Sacramento Office
G. I. Fleckenstein—Folsom
Euell Gray—Placerville
R. C. O'Connor—Grass Valley
Nelson Poole—Sacramento Office
Wm. C. Raffetto—Sacramento
Charles Sibeck—Galt
R. L. Sinkey—Woodland
A. H. Willard—Rocklin
JOHN O'CONNELL—Stockton
W. J. Black—Rio Vista
L. W. Dinsdale—Murphy

WALTER B. SELLMER—Fairfax
William Armstrong—Vallejo
George N. Johnson—Napa
WM. LIPPINCOTT—Yreka
J. F. French—Alturas
S. R. Gilloon—Mount Shasta
F. A. Greene—Redding
B. L. Hammack—Fort Jones
Fred R. Starr—Macdoel
S. J. CARPENTER—Maxwell
Harry N. Brittan—Red Bluff
J. V. Shearin—Stonyford
A. J. Stanley—Chico
Geo. Thompson—Gridley
HENRY LENCIONI—Santa Rosa
J. H. Groves—Cloverdale
Victor E. Von Arx—Cazadero
JOSEPH H. SANDERS—Truckee
C. J. Barnes—Portola
C. O. Fisher—Susanville
J. E. NEWSOME—Newman
L. W. Longeway—Sonora
Geo. Magladry—Modesto
H. I. Pritchard—Atwater
Geo. R. Smalley—Madera
E. W. SMALLEY—Hanford
F. A. Bullard—Dunlap
Ray C. Ellis—Fresno
Wm. T. Smalley—Visalia
C. B. Tibbetts—Kernville
K. P. ALLRED—San Luis Obispo
H. E. Black—San Luis Obispo
J. H. Hill—Hollister
Ralph Newsome—King City
Fred H. Post—Salinas
J. P. Vissiere—Watsonville

UNATTACHED.

Earl P. Barnes—Eureka
T. M. Benson—Fortuna
J. H. Hellard—Willits
Ovid Holmes—Fort Bragg
G. O. Laws—Weaverville
McPherson Lough—Eureka
R. C. Marshall—Douglas City
H. S. Prescott—Crescent City
K. J. Ransdell—Ukiah
J. D. Dondero—Lakeport

LAUNCH PATROL

Walter Engelke—Launch "Albacore," San Pedro
Charles M. Bouton—Launch "Quinnat," San Rafael
Wm. Armstrong—Launch "Hunter," Vallejo
C. A. Crosbie—Launch "Steelhead," Monterey

STATE LION HUNTER

Jay C. Bruce—San Lorenzo

Captains indicated in capitals.

CALIFORNIA STATE PRINTING OFFICE
SACRAMENTO, 1927

CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

Volume 13 Sacramento, October, 1927 Number 4

54549

DEPARTMENT OF NATURAL RESOURCES.

DIVISION OF FISH AND GAME.

Sacramento, California.

Fish and Game Commission appointed by the Governor. Term at pleasure of Governor. No compensation.

I. ZELLERBACH, President—San Francisco
GEORGE B. CLARKSON, Commissioner—Los Angeles
REGINALD S. FERNALD, Commissioner—Santa Barbara
B. D. MARX GREENE, Executive Officer and Attorney—San Francisco
MRS. P. A. FORD, Secretary to Commission—San Francisco
J. S. Hunter, Assistant to Executive Officer—San Francisco
Ralph W. Scott, Assistant Attorney—San Francisco
Walter Welch, Field Assistant—San Francisco
Postal Telegraph Building, San Francisco. Phone Sutter 6100.

DEPARTMENT OF FISH CULTURE.

W. H. SHEBLEY, Director—Sacramento
E. W. Hunt, Field Superintendent—Sacramento
G. H. Lambson, Superintendent Mt. Shasta Hatchery and Klamath River Stations—Mt Shasta
E. V. Cassell, Foreman in Charge Fall Creek Hatchery—Copco
Guy Tabler, Foreman in Charge Yosemite and Wawona Hatcheries—Yosemite
C. L. Frame, Foreman in Charge Brookdale Hatchery—Brookdale
J. C. Lewis, Foreman in Charge Fort Seward Hatchery—Alderpoint
J. W. Ricker, Foreman in Charge Ukiah Hatchery—Ukiah
J. Shebley, Foreman in Charge Feather River Hatchery—Clio
Ed. Clessens, Foreman in Charge Kaweah Hatchery—Hammond
Geo. McCloud, Superintendent Mt. Whitney Hatchery—Independence
Geo. E. West, Superintendent Tahoe Hatchery—Tahoe
F. F. Anderson, Superintendent Domingo Springs Hatchery—Westwood
D. A. Clanton, Foreman in Charge Bear Lake Hatchery—Pine Knot
L. Phillips, Superintendent of Car No. 01—Mt. Shasta
Ross McCloud, Superintendent of Car No. 02—Mt. Shasta

DEPARTMENT OF COMMERCIAL FISHERIES.

N. B. SCOFIELD, Director—San Francisco
H. B. Nidever, Supervising Captain—Terminal Island
S. H. Dado, Supervising Captain—San Francisco
R. L. Classic, Captain—Monterey
Coburn F. Maddox, Captain—San Diego
W. L. Scofield, Acting Director State Fisheries Laboratory—Terminal Island
W. F. Thompson, Consultant, State Fisheries Laboratory—Terminal Island

COMMERCIAL FISHERIES PATROL.

F. P. Bacon—Terminal Island
Paul Bonnot—San Francisco
N. C. Kunkel—Terminal Island
Ross W. Markley—Pismo
Tate F. Miller—Terminal Island
L. G. Van Vorhis—Pittsburg

LAUNCH PATROL.

Walter Engelke—Launch "Albacore," San Pedro
M. M. Tritch—Launch "Albacore," San Pedro
C. A. Crosbie—Launch "Steelhead," Monterey

BUREAU OF FINANCE AND ACCOUNTS.

H. R. DUNBAR, Assistant Executive Officer and in Charge—Sacramento

BUREAU OF EDUCATION.

DR. H. C. BRYANT, Director—San Francisco
Rodney S. Ellsworth, Assistant—San Francisco

BUREAU OF PUBLIC RELATIONS.

FRANK H. VORE, Director—San Francisco

BUREAU OF HYDRAULICS.

(Screens, Ladders and Pollution.)

JOHN SPENCER, In Charge—San Francisco
Clarence Elliger, Assistant—San Francisco

BUREAU OF GAME FARMS.

AUGUST BADE, Superintendent—Yountville

BUREAU OF RESEARCH.

R. E. LUDLUM, Director—San Francisco
Robt. J. Irvine, Chemist—San Francisco

PATROL SERVICE.

K. P. ALLRED, Acting Chief of Patrol—San Francisco
M. S. Clark, Assistant Chief of Patrol for Northern California—San Francisco
C. S. Bauder, Assistant Chief of Patrol for Southern California—Los Angeles
O. P. Brownlow, Captain, In Charge Fish Planting—San Francisco
S. R. Briggs, Chief Clerk—San Francisco

Earl P. Barnes—Eureka
T. M. Benson—Fortuna
H. E. Black—San Luis Obispo
C. L. Bundock—San Francisco Office
J. L. Bundock—Oakland
Jack Burke—Daly City
F. A. Burke—King City
E. R. Caldwell—San Francisco Office
T. K. Duncan—Concord
J. H. Hill—Hollister
C. E. Holladay—Morgan Hill
I. L. Koppel—San Jose
G. O. Laws—Weaverville
Taylor London—Requa
McPherson Lough—Eureka
R. C. Marshall—Douglas City
E. V. Moody—Santa Cruz
Ralph Newsome—King City
Fred H. Post—Salinas
H. S. Prescott—Crescent City
J. P. Vissiere—Watsonville

LA RUE CHAPPELL—Los Angeles Office

E. H. OBER—Big Pine
W. E. Adkinson—El Toro
R. E. Bedwell—Ventura
E. A. Chan—Santa Ana
A. F. Crocker—Big Pine
C. S. Donham—Riverside
Walter Emerick—Ventura
E. H. Glidden—San Diego
J. H. Gyger—Perris
W. L. Hare—Owensmouth
E. S. Hurlbut—Independence
R. J. Little—Banning
S. H. Lyons—Solvang
W. C. Malone—San Bernardino
D. R. Oliver—Lone Pine
E. D. Ricketts—Los Angeles Office
R. J. Sadler—Los Angeles Office
Carmi Savage—Ontario
J. W. Thornburg—Markleeville
Albert Veil—Los Angeles Office
C. J. Walters—Independence

D. E. ROBERTS—Sacramento Office
G. I. Fleckenstein—Folsom
Euell Gray—Placerville
R. C. O'Connor—Grass Valley
Nelson Poole—Sacramento Office
C. Sibeck—Sacramento Office
R. L. Sinkey—Woodland
A. H. Willard—Rocklin

WM. LIPPINCOTT—Yreka
Ray Diamond—Orleans
J. F. French—Fall River Mills
S. R. Gilloon—Mt. Shasta

F. A. Greene—Redding
B. L. Hammack—Fort Jones
A. A. Jordan—Alturas
Fred R. Starr—Macdoel

S. J. CARPENTER—Maxwell
R. W. Anderson—Orland
Harry N. Brittan—Red Bluff
L. W. Dinsdale—Yuba City
J. V. Shearin—Stonyford
A. J. Stanley—Chico
Geo. Thompson—Gridley

J. D. DONDERO—Lakeport
Ovid Holmes—Fort Bragg
J. H. Hellard—Willits
G. N. Johnson—Napa
E. F. Macklin—Ukiah
K. J. Ransdell—Middletown

HENRY LENCIONI—Santa Rosa
J. H. Groves—Cloverdale
V. E. Von Arx—Cazadero

W. B. SELLMER—Fairfax
Wm. Armstrong—Vallejo
C. M. Bouton—San Rafael
C. F. England—San Rafael
C. H. McDaniels—Crockett

JOSEPH H. SANDERS—Truckee
C. J. Barnes—Portola
C. O. Fisher—Susanville
W. I. Long—Westwood
A. Miner—Quincy
Oscar Schumaker—Meyers Station

J. E. NEWSOME—Newman
W. C. Blewett—Los Banos
C. L. Brown—Mariposa
C. L. Gourley—Gustine
L. W. Longeway—Sonora
Geo. Magladry—Modesto
H. I. Pritchard—Atwater
Geo. R. Smalley—Madera

JOHN O'CONNELL—Stockton
W. J. Black—Rio Vista
Wm. Hoppe—Knightsen
Bert Laws—San Rafael
Geo. Pickering—West Point
Wm. Raffetto—Sacramento

E. W. SMALLEY—Hanford
A. R. Ainsworth—Taft
L. Arnold—Bakersfield
F. A. Bullard—Dunlap
R. J. Bullard—Visalia
Ray Ellis—Fresno
W. T. Smalley—Porterville
C. R. Taylor—Coalinga
C. B. Tibbetts—Kernville

LAUNCH PATROL.

W. B. SELLMER, In Charge—Fairfax
C. M. Bouton—Launch "Quinnat," San Rafael
Wm. Armstrong—Launch "Hunter," Vallejo

STATE LION HUNTER.

Jay C. Bruce—San Lorenzo

Captains indicated in capitals.

CALIFORNIA STATE PRINTING OFFICE
SACRAMENTO, 1927